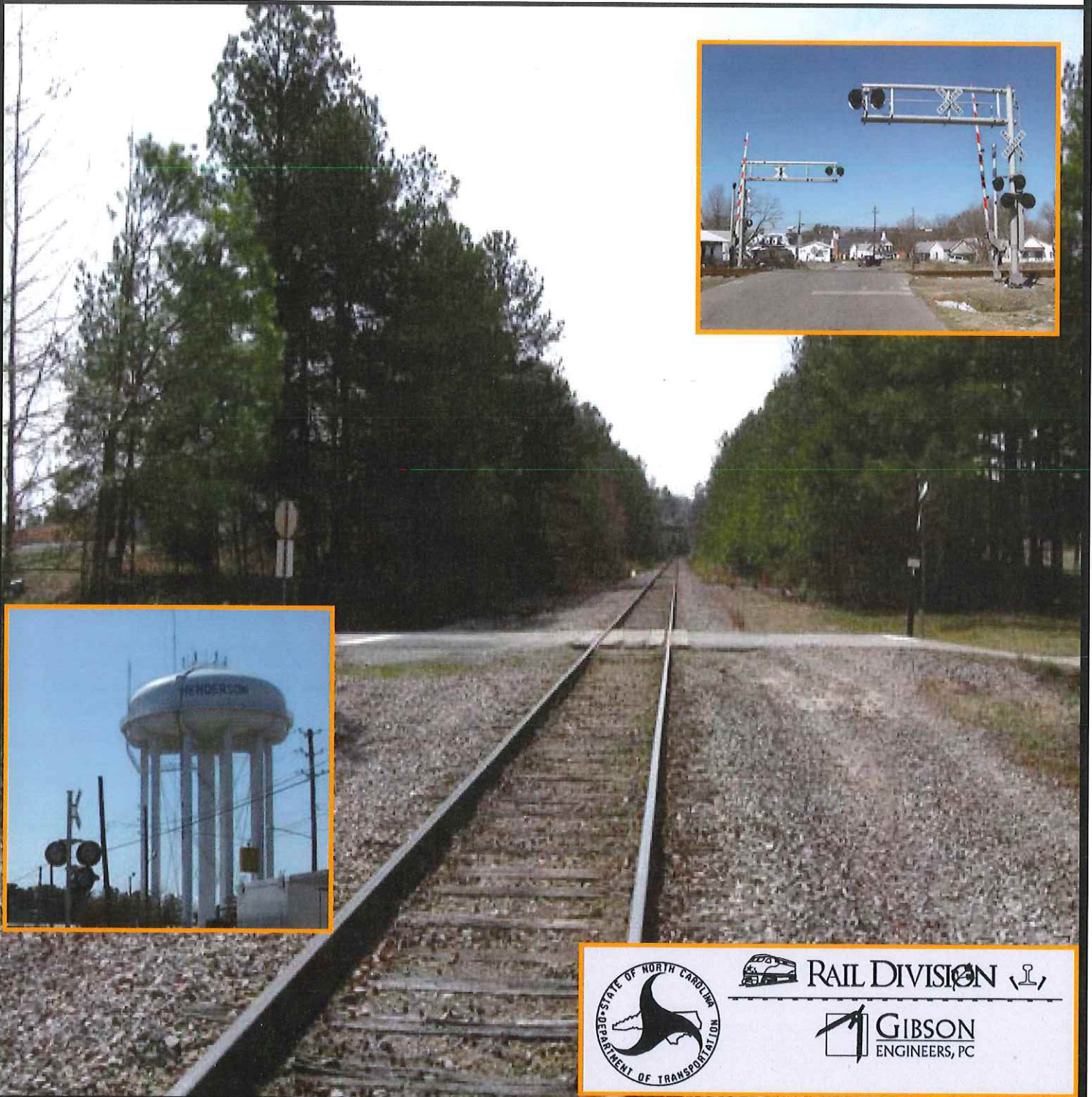


HENDERSON

TRAFFIC SEPARATION STUDY



RAIL DIVISION



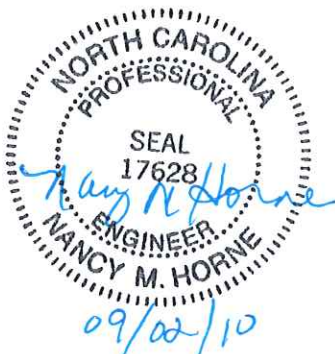
GIBSON
ENGINEERS, PC

Henderson Traffic Separation Study

Gibson Project Number 00030.09

Gibson Engineers, PC
Post Office Box 700
Fuquay-Varina, NC 27526
(919) 552-2253

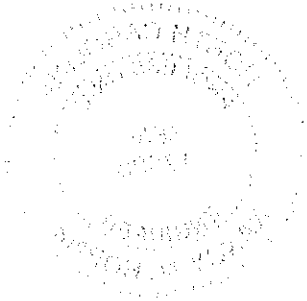
August, 2010



Nancy Horne, PE
NCDOT Rail Division



Mark Freeman, PE
Gibson Engineers, PC (License # C-2487)



Executive Summary

The North Carolina Department of Transportation in conjunction with the City of Henderson and CSX Transportation has gathered information and received public comments in regard to safety improvement and closure recommendations of select rail crossings in the City of Henderson, North Carolina. The study process began a comprehensive data collection effort, followed by field investigation of crossings. Using this information, an initial set of recommendations was developed. The draft recommendations were then presented to a stakeholder committee to obtain valuable local input. Once the City Council was briefed on the project, a public workshop was held to explain the study process, present recommendations, and to take public comments. Next, the stakeholders were reconvened to discuss the public comments and to assist in making revisions to the draft plan. Finally, the revised plan was presented to the area residents through a formal public hearing. The following section provides additional details on each of the aforementioned steps.

Stakeholder Meeting #1

A stakeholder committee was formed with the understanding that their knowledge of the study area was critical in forming a consensus on rail crossing recommendations. The following agencies comprised the stakeholder committee:

- City of Henderson Manager
- City of Henderson Police
- City of Henderson Fire
- City of Henderson Planning Director
- City of Henderson Chamber of Commerce
- City of Henderson Downtown Development Corporation
- Vance County Public School
- NCDOT Division Engineers

- NCDOT District Engineers
- NCDOT Rail Division
- CSX

The first stakeholder meeting was held on June 30, 2009. The purpose of this meeting was to present the initial findings and recommendations to the committee. The committee requested surface improvements be made to the Chavasse crossing, noting that there is a NCDOT project at this crossing, but is currently on hold. The project was originally put on hold to await the completion of the traffic separation. Since that time, funding shortfalls have negatively affected the possibility of NCDOT completing the project in the near term. Bear Pond Road was also requested to be added to the study, but was determined to be outside the city limits.

Henderson City Council Presentation

A presentation was made to the Henderson City Council on July 27, 2009 regarding the progress of the study and recommendations generated from the study. No major concerns or issues were raised by the City Council.

Public Workshop

A public workshop for the project was held in the City of Henderson on November 17, 2009 at the City Council Chamber. The objective of the public meeting was to present the recommendations and their potential impact on traffic flow for each of the 20 crossings and to receive public comment on the recommendations.

Most of the comments received from the meeting were in regard to the proposed closures of the Harris Street crossing and the St. Matthews Street crossing. Specifically, local residents were concerned with emergency service response times to their homes should these crossings be closed.

Stakeholder Meeting #2

The second meeting of the Stakeholder Committee was held on January 13, 2010. The purpose of this meeting was to discuss the public comments regarding the recommendations and to reach a final consensus on recommendations for the implementation phase.

The committee requested that the Harris Street and St. Matthews Street crossings remain open due to impact on Fire Department and Police Department response times. However, the plan will recommend improvements to sight distance through possible clearing of vegetation for the St. Matthews Street crossing. It was also requested that the possibility of revising signal timings at Andrews Avenue be investigated such that left-turns onto NC 39 would still be permitted.

Public Hearing

The City of Henderson held a public hearing for the project during their April 12, 2010 City Council meeting. The hearing was advertised following the adopted public involvement policy of the City. During the hearing, two citizens spoke in opposition to the project, citing the potential of the proposed closures to divide the community, and to inconvenience downtown merchants who use the crossings to bring products to their stores. After discussing the issues, the Council voted 5-3 to approve the plan as presented.

The following **Figure EX-1** details the study area with recommended actions:

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E-mail address: shirley@cs.cmu.edu

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CONCLUSIONS

SYNTHESIS AND

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# HENDERSON, NC: TRAFFIC SEPARATION STUDY GRADE CROSSING MAP

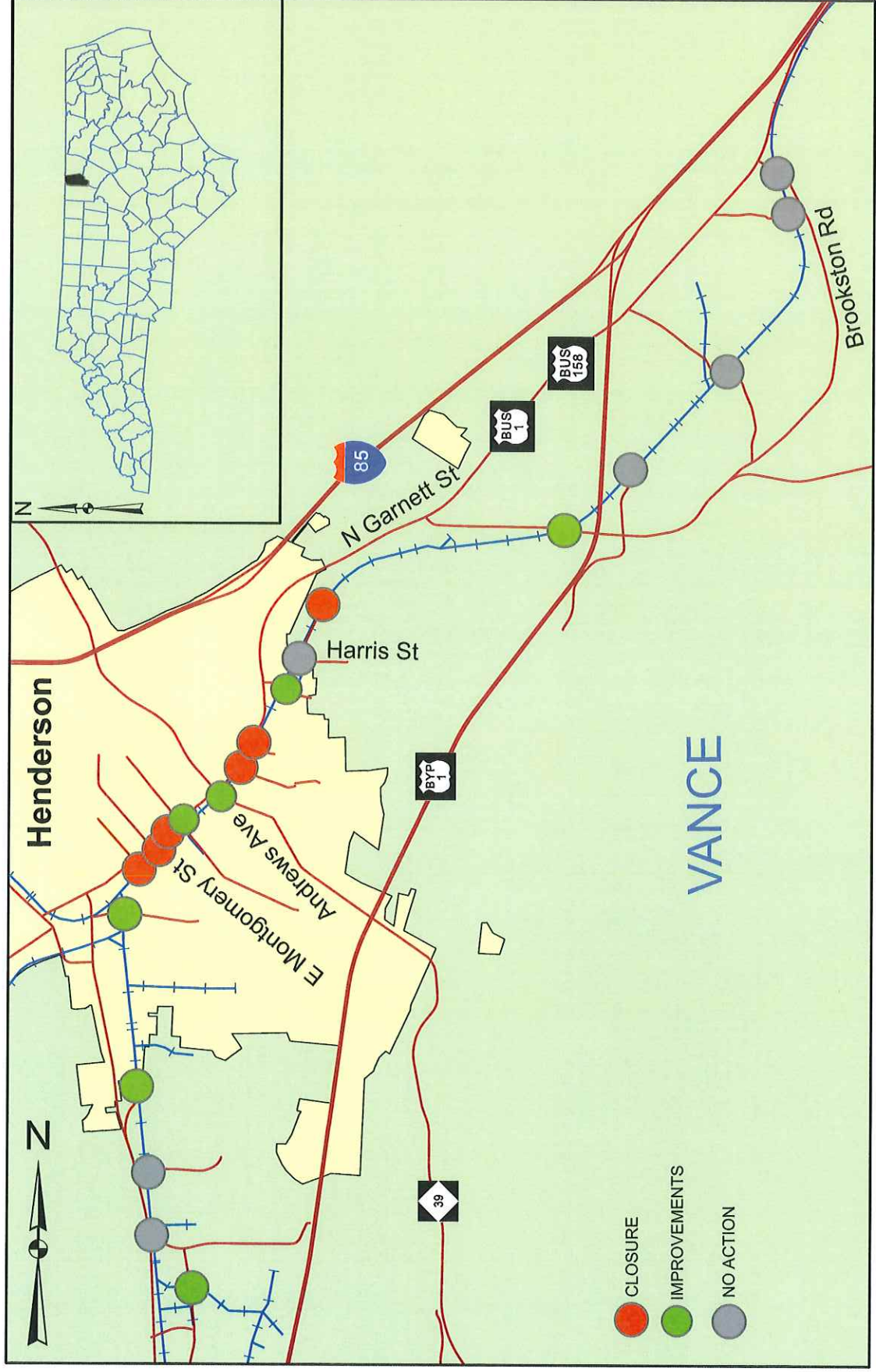


Figure EX-1

[illegible]

The following table provides the recommendations for each crossing in the study area.

**Table EX-1: Henderson Traffic Separation Study Recommendations**

| <b>Crossing Number</b> | <b>Street Name</b> | <b>Existing Protective Device</b> | <b>Suggested Action</b>                                                             | <b>Timeframe</b> |
|------------------------|--------------------|-----------------------------------|-------------------------------------------------------------------------------------|------------------|
| 630 418S               | Brookston Rd.      | Gates and Flashers                | No Action                                                                           | N/A              |
| 630 419Y               | Buchan Best Ln.    | Signs                             | No Action                                                                           | N/A              |
| 630 421A               | Greystone Rd.      | Cantilever and Gates              | No Action                                                                           | N/A              |
| 630 423N               | N. Oliver Dr.      | Signs                             | No Action                                                                           | N/A              |
| 630 424V               | Warrenton Rd.      | Cantilever and Gates              | Improve Crossing Surface - Milling & Resurfacing                                    | Near Term        |
| 630 427R               | Railroad St.       | Signs                             | Closure                                                                             | Mid Term         |
| 630 428X               | Harris St.         | Gates and Flashers                | No Action                                                                           | N/A              |
| 630 429E               | Main / Craig Ave.  | Cantilever and Gates              | Removal of Hump                                                                     | Mid Term         |
| 630 432M               | Carter's Crossing  | Flashers                          | Closure                                                                             | Near Term        |
| 630 433U               | Rock Spring St.    | Gates and Flashers                | Closure                                                                             | Mid Term         |
| 630 483X               | Andrews Ave.       | Cantilever and Gates              | Improve Crossing Surface, Investigate Signal Timing Changes at NC39 and Garnett St. | Mid Term         |
| 630 485L               | Montgomery St.     | Cantilever and Gates              | Remove Parking Along Street                                                         | Near Term        |
| 630 486T               | Winder St.         | Cantilever and Gates              | Closure                                                                             | Near Term        |

| <b>Crossing Number</b> | <b>Street Name</b> | <b>Existing Protective Device</b> | <b>Suggested Action</b>             | <b>Timeframe</b> |
|------------------------|--------------------|-----------------------------------|-------------------------------------|------------------|
| 630 487A               | Orange St.         | Gates and Flashers                | Closure                             | Mid Term         |
| 630 488G               | Spring St.         | Cantilever and Gates              | Closure                             | Near Term        |
| 630 489N               | Chavasse Ave.      | Gates and Flashers                | Improve Crossing Surface            | Mid Term         |
| 630 494K               | St. Matthews St.   | Cantilever and Gates              | Remove Vegetation in Sight Distance | Near Term        |
| 630 495S               | Welcome Ave.       | Gates and Flashers                | No Action                           | N/A              |
| 630 497F               | J.P. Taylor Rd.    | Gates and Flashers                | No Action                           | N/A              |
| 630 498M               | Warehouse Rd       | Signs                             | Add Gates                           | Mid Term         |



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## **APPENDICES**

**Appendix A – Stakeholder Meeting Minutes**

**Appendix B – Newsletter  
(Newsletter for DRAFT Recommendations  
Provided at the Workshop)**

**Appendix C – Public Meeting Sign-In Sheets**

**Appendix D – GradeDec**



## A. Introduction

The purpose of this study is to identify opportunities to consolidate or improve highway-railway crossing. This study will benefit the City of Henderson and the traveling public by reducing the potential for train-vehicle collisions. An additional benefit of an overall closure plan is that mitigation can be determined on a system level, impacts are recognized as a whole, rather than just at specific locations and stakeholders and the public are made aware of the plan well in advance of any closure activities.

During 2007, there were 68 rail-highway grade crossing collisions in North Carolina, resulting in five (5) deaths and 20 injuries. To reduce the potential for train-vehicle collisions, NCDOT is working with communities across the state to conduct detailed engineering evaluations and implement recommended improvements to rail crossings. Volume of train traffic and flow of vehicular traffic patterns are taken into consideration in the Traffic Separation Study (TSS). The TSS, conducted by NCDOT, provides recommendations for crossing surface improvements, crossing relocation, and/or closure. These enhancements result in improving the safety of motorists, pedestrians, rail passengers, and train crews. NCDOT has closed approximately 155 public rail crossings based on recommendations from various TSS and corridor studies since 1993. The following briefly describes the overall process followed for the Henderson TSS:

### 1. Preliminary Phase

The NCDOT and the City of Henderson discussed the Traffic Separation Study (TSS) process, as well as the desired goals and objectives of this particular effort. Next, an engineering consultant was selected to assist NCDOT in the evaluation of the crossings in the study area.



## 2. Study Phase

All public crossings encompassed by the study area are assessed. Present crossing conditions, average daily traffic of both trains and vehicles, along with the impact of potential crossing closures are taken into account. Time frames and possible recommendations for affected crossings are as follows:

- Near-term recommendations (within two years)

Typically includes installation of flashing lights and gates, enhanced safety devices such as longer gates or four quadrant gates, installation of improved crossing surfaces such as concrete or rubber, crossing closures, barrier installation, pavement markings, roadway approach modifications, some crossing closures, and crossing realignments.

- Mid-term recommendations (within two to five years)

May include minor connector roads, roadway realignments, relocations of crossings, feasibility studies and crossing closures.

- Long-term recommendations (within five to ten years)

May include construction of grade separated crossings, connector roads, and crossing closures.

## 3. Implementation Process

Upon completion of the study phase, NCDOT officials will identify funding for the stated enhancements, prepare agreements with the City of Henderson, coordinate project design and property attainment, coordinate crossing closures with the appropriate railroad and highway officials, and oversee project implementation.





## B. Data Collection

**Table B-1** describes the information that was gathered for each crossing. This information was used in the evaluation of the traffic and safety conditions.

**Table B-1**

| Data Item                           | Source                                   |
|-------------------------------------|------------------------------------------|
| Crossing Number                     | NCDOT Rail                               |
| Street of Route                     | NCDOT Rail                               |
| Railroad Company                    | NCDOT Rail                               |
| Railroad Milepost                   | NCDOT Rail                               |
| Existing Warning Devices            | Site Inspection                          |
| Vehicle Traffic                     | NCDOT                                    |
| 24 hour train volumes               | FRA Inventory Forms                      |
| Accident History                    | Accident Reports (NCDOT & FRA)           |
| Street Classification               | FRA Inventory Forms                      |
| Truck Route                         | NCDOT                                    |
| Transit Route                       | N/A                                      |
| School Bus Route (Yes/No)           | Vance County School System               |
| Crossing Surface and Condition      | Site Inspection                          |
| Land Use                            | Site Inspection                          |
| Redundant Crossing (Yes/No)         | Site Inspection                          |
| Potential for Grade Separation      | Exposure Index *                         |
| Humped Crossing                     | Site Inspection                          |
| Crossing Geometry                   | Site Inspection                          |
| Needs for Enhanced Warning devices  | Site Inspection and accident history     |
| Feasibility of Roadway Improvements | Site Inspection and engineering judgment |

\*Exposure Index = number of trains per day x average daily traffic at highway/rail crossing

Data summary sheets for each crossing are located in **Figures B-1a to B-20a**. Corresponding photos for each crossing are located in **Figures B-1b to B-20b**. See **Table B2** for a listing of Figures.

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**Table B2 - INDEX FOR GRADE CROSSING FIGURES**

| Crossing Reference Number | Crossing Number | Street Name       | Existing Conditions Figure # | Crossing Photos | Recommendations Figure # |
|---------------------------|-----------------|-------------------|------------------------------|-----------------|--------------------------|
| 1                         | 630 418S        | Brookston Rd.     | B-1a                         | B-1b            | G-1                      |
| 2                         | 630 419Y        | Buchan Best Ln.   | B-2a                         | B-2b            | G-2                      |
| 3                         | 630 421A        | Greystone Rd.     | B-3a                         | B-3b            | G-3                      |
| 4                         | 630 423N        | N. Oliver Dr.     | B-4a                         | B-4b            | G-4                      |
| 5                         | 630 424V        | Warrenton Rd.     | B-5a                         | B-5b            | G-5                      |
| 6                         | 630 427R        | Railroad St.      | B-6a                         | B-6b            | G-6                      |
| 7                         | 630 428X        | Harris St.        | B-7a                         | B-7b            | G-7                      |
| 8                         | 630 429E        | Main / Craig Ave. | B-8a                         | B-8b            | G-8                      |
| 9                         | 630 432M        | Carter's Crossing | B-9a                         | B-9b            | G-9                      |
| 10                        | 630 433U        | Rock Spring St.   | B-10a                        | B-10b           | G-10                     |
| 11                        | 630 483X        | Andrews Ave.      | B-11a                        | B-11b           | G-11                     |
| 12                        | 630 485L        | Montgomery St.    | B-12a                        | B-12b           | G-12                     |
| 13                        | 630 486T        | Winder St.        | B-13a                        | B-13b           | G-13                     |
| 14                        | 630 487A        | Orange St.        | B-14a                        | B-14b           | G-14                     |
| 15                        | 630 488G        | Spring St.        | B-15a                        | B-15b           | G-15                     |
| 16                        | 630 489N        | Chavasse Ave.     | B-16a                        | B-16b           | G-16                     |
| 17                        | 630 494K        | St. Matthews St.  | B-17a                        | B-17b           | G-17                     |
| 18                        | 630 495S        | Welcome Ave.      | B-18a                        | B-18b           | G-18                     |
| 19                        | 630 497F        | J.P. Taylor Rd.   | B-19a                        | B-19b           | G-19                     |
| 20                        | 630 498M        | Warehouse Rd.     | B-20a                        | B-20b           | G-20                     |

Figures included in this section

| Brookston Road     |     |                           |  |                |  |                           |  |        |  | Crossing 630 418S |  |  |
|--------------------|-----|---------------------------|--|----------------|--|---------------------------|--|--------|--|-------------------|--|--|
| 24 Hour ADT        | 704 | Functional Classification |  | Rural Local    |  | Railroad operator         |  | CSX    |  |                   |  |  |
| 24 Hour Train vol  | 5   | Land Use                  |  | Open Space     |  | MP                        |  | 108.64 |  |                   |  |  |
| Transit Route      | No  | Exist. Warning Device     |  | Gates          |  | Crossing Sight Condition  |  | Poor   |  |                   |  |  |
| School Bus Route   | Yes | Preemption                |  | N/A            |  | Redundant Crossing        |  | No     |  |                   |  |  |
| Truck Route        | No  | Crossing issue            |  | Sight distance |  | Economic Impact if closed |  | Low    |  |                   |  |  |
| Bike Route         | No  | Crossing Geometry         |  | Good           |  | Exposure Index            |  | 3.520  |  |                   |  |  |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   |  | No             |  | Accident History          |  | 3      |  |                   |  |  |



Figure B-1a



# Crossing# 630 418S (Brookston Road)



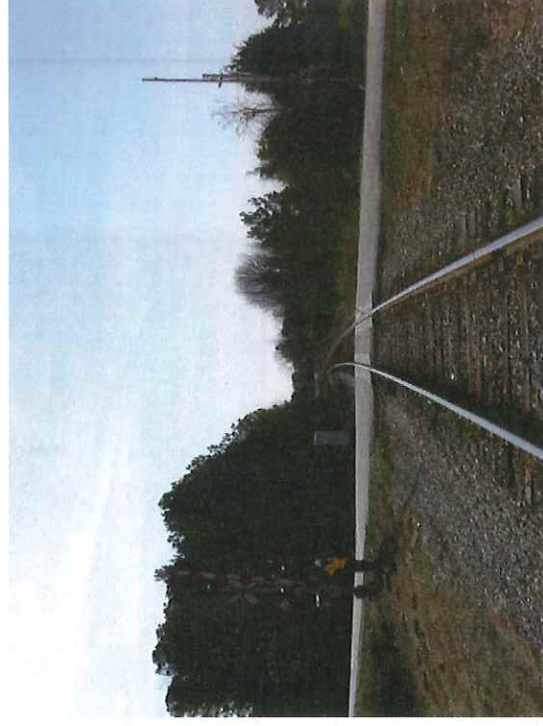
Looking East



Looking North



Looking West



Looking South

| Buchan Best Lane   |     |                           |  |                |  |                           |  |        |  | Crossing 630 419Y |  |
|--------------------|-----|---------------------------|--|----------------|--|---------------------------|--|--------|--|-------------------|--|
| 24 Hour ADT        | UNK | Functional Classification |  | UNK            |  | Railroad operator         |  | CSX    |  |                   |  |
| 24 Hour Train vol  | 5   | Land Use                  |  | Residential    |  | MP                        |  | 108.89 |  |                   |  |
| Transit Route      | No  | Exist. Warning Device     |  | Crossbucks     |  | Crossing Sight Condition  |  | Fair   |  |                   |  |
| School Bus Route   | No  | Preemption                |  | N/A            |  | Redundant Crossing        |  | No     |  |                   |  |
| Truck Route        | No  | Crossing issue            |  | Sight distance |  | Economic Impact if closed |  | Low    |  |                   |  |
| Bike Route         | No  | Crossing Geometry         |  | Fair           |  | Exposure Index            |  | UNK    |  |                   |  |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   |  | No             |  | Accident History          |  | N/A    |  |                   |  |

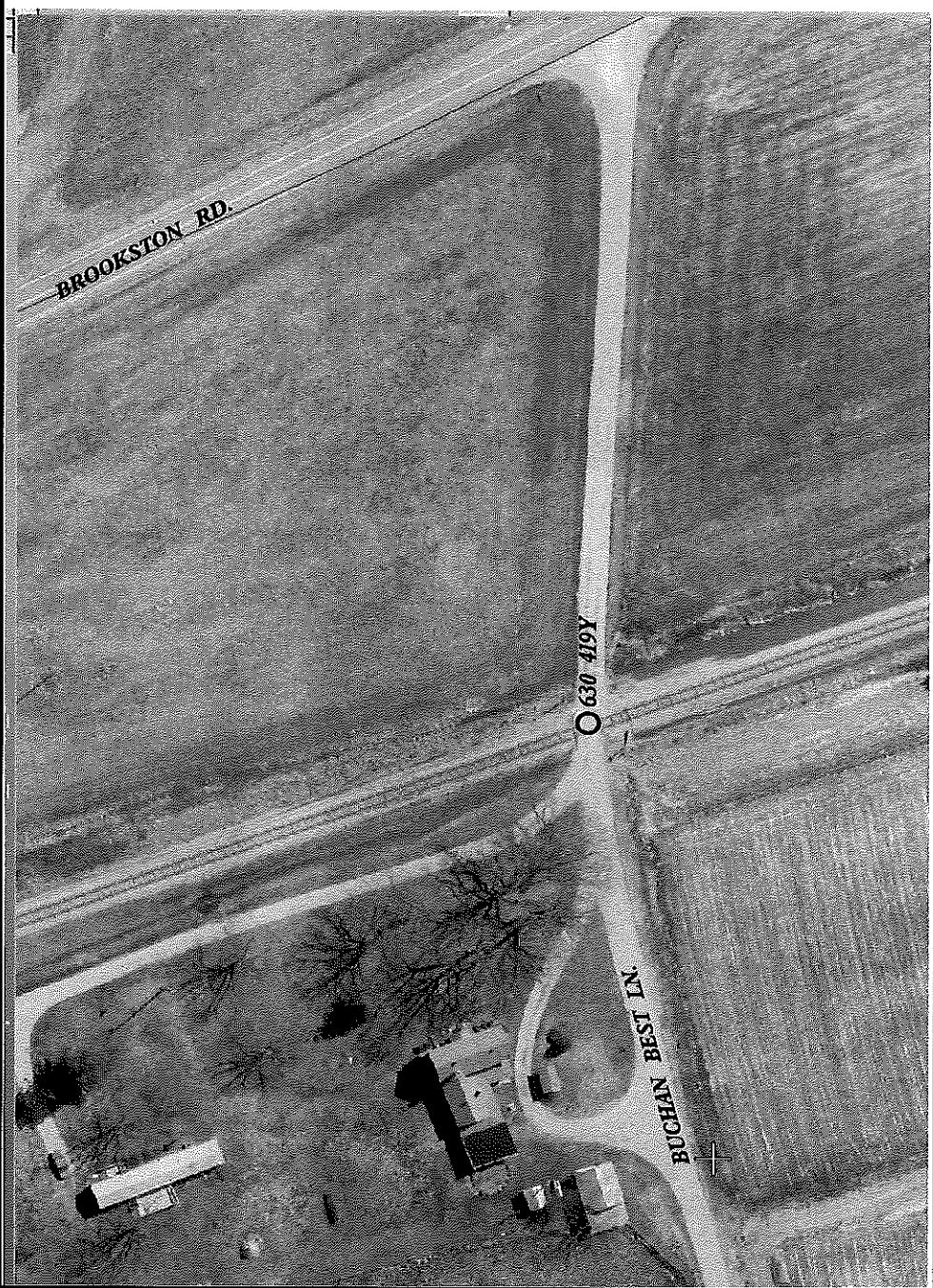


Figure B-2a



# Crossing# 630 419Y (Buchan Best Lane)



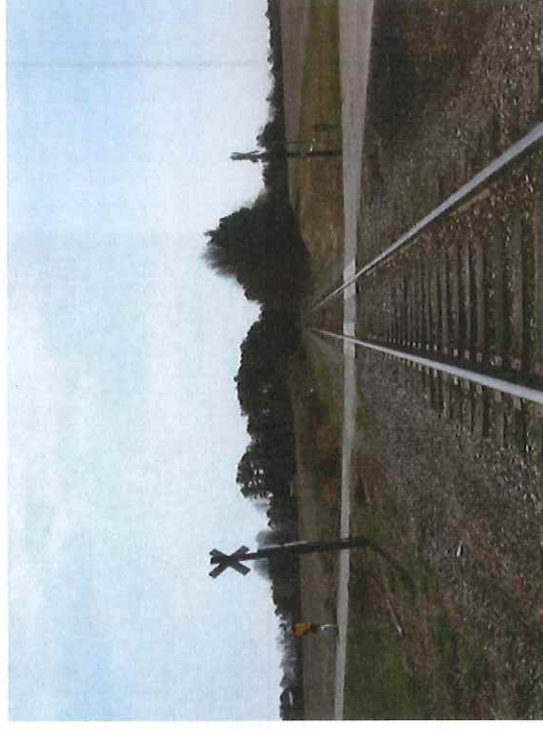
Looking East



Looking North



Looking West



Looking South

| Greystone Road     |     |                           |  |                 | Crossing 630 421A         |        |  |
|--------------------|-----|---------------------------|--|-----------------|---------------------------|--------|--|
| 24 Hour ADT        | 520 | Functional Classification |  | Rural Local     | Railroad operator         | CSX    |  |
| 24 Hour Train vol  | 5   | Land Use                  |  | Industrial      | MP                        | 110.09 |  |
| Transit Route      | No  | Exist. Warning Device     |  | Gates and Cant. | Crossing Sight Condition  | Poor   |  |
| School Bus Route   | No  | Preemption                |  | N/A             | Redundant Crossing        | No     |  |
| Truck Route        | No  | Crossing issue            |  | Sight distance  | Economic Impact if closed | Med    |  |
| Bike Route         | No  | Crossing Geometry         |  | Good            | Exposure Index            | 2,600  |  |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   |  | No              | Accident History          | N/A    |  |



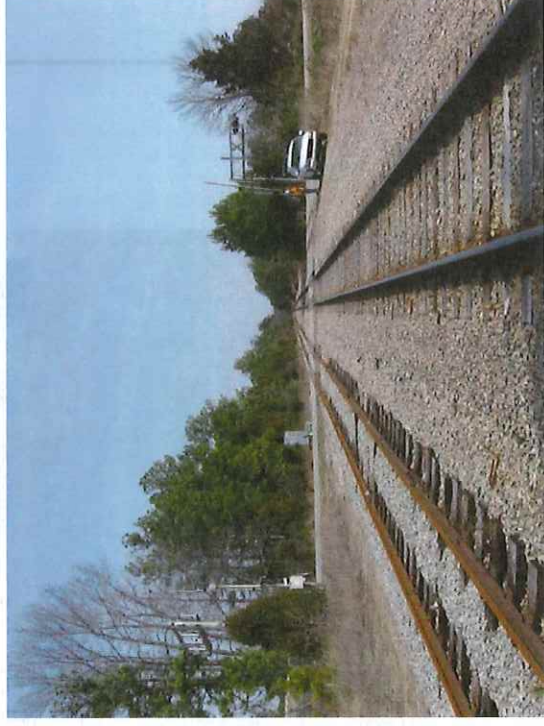
Figure B-3a



## Crossing# 630 421A (Greystone Road)



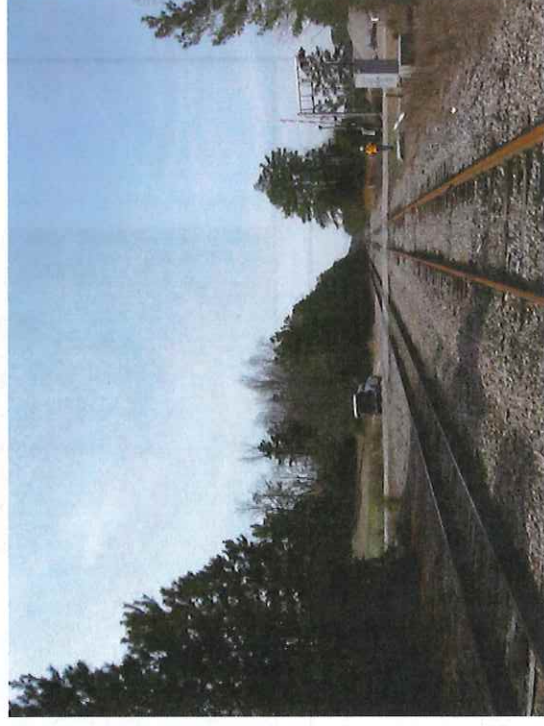
Looking East



Looking North



Looking West



Looking South

| North Oliver Drive |     |                           |  |  |  |                |  |  |  | Crossing 630 423N         |        |
|--------------------|-----|---------------------------|--|--|--|----------------|--|--|--|---------------------------|--------|
| 24 Hour ADT        | 98  | Functional Classification |  |  |  | UNK            |  |  |  | Railroad operator         | CSX    |
| 24 Hour Train vol  | UNK | Land Use                  |  |  |  | Residential    |  |  |  | MP                        | 110.59 |
| Transit Route      | No  | Exist. Warning Device     |  |  |  | Crossbucks     |  |  |  | Crossing Sight Condition  | Poor   |
| School Bus Route   | No  | Preemption                |  |  |  | N/A            |  |  |  | Redundant Crossing        | No     |
| Truck Route        | No  | Crossing issue            |  |  |  | Sight distance |  |  |  | Economic Impact if closed | Low    |
| Bike Route         | No  | Crossing Geometry         |  |  |  | Fair           |  |  |  | Exposure Index            | UNK    |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   |  |  |  | No             |  |  |  | Accident History          | N/A    |



Figure B-4a



# Crossing# 630 423N (N. Oliver Drive)



Looking East



Looking North



Looking West



Looking South



| Warrenton Road     |       |                           |  |                 |  |                           |  |  |  | Crossing 630 424V |  |  |
|--------------------|-------|---------------------------|--|-----------------|--|---------------------------|--|--|--|-------------------|--|--|
| 24 Hour ADT        | 9,100 | Functional Classification |  | Rural Local     |  | Railroad operator         |  |  |  | CSX               |  |  |
| 24 Hour Train vol  | 5     | Land Use                  |  | Commercial      |  | MP                        |  |  |  | 111.08            |  |  |
| Transit Route      | No    | Exist. Warning Device     |  | Gates and Cant. |  | Crossing Sight Condition  |  |  |  | Poor              |  |  |
| School Bus Route   | Yes   | Preemption                |  | N/A             |  | Redundant Crossing        |  |  |  | No                |  |  |
| Truck Route        | No    | Crossing issue            |  | Sight distance  |  | Economic Impact if closed |  |  |  | High              |  |  |
| Bike Route         | No    | Crossing Geometry         |  | Poor            |  | Exposure Index            |  |  |  | 45,500            |  |  |
| Emer Serv Critical | N/A   | Need for X-ing Surf Imp   |  | Yes             |  | Accident History          |  |  |  | N/A               |  |  |

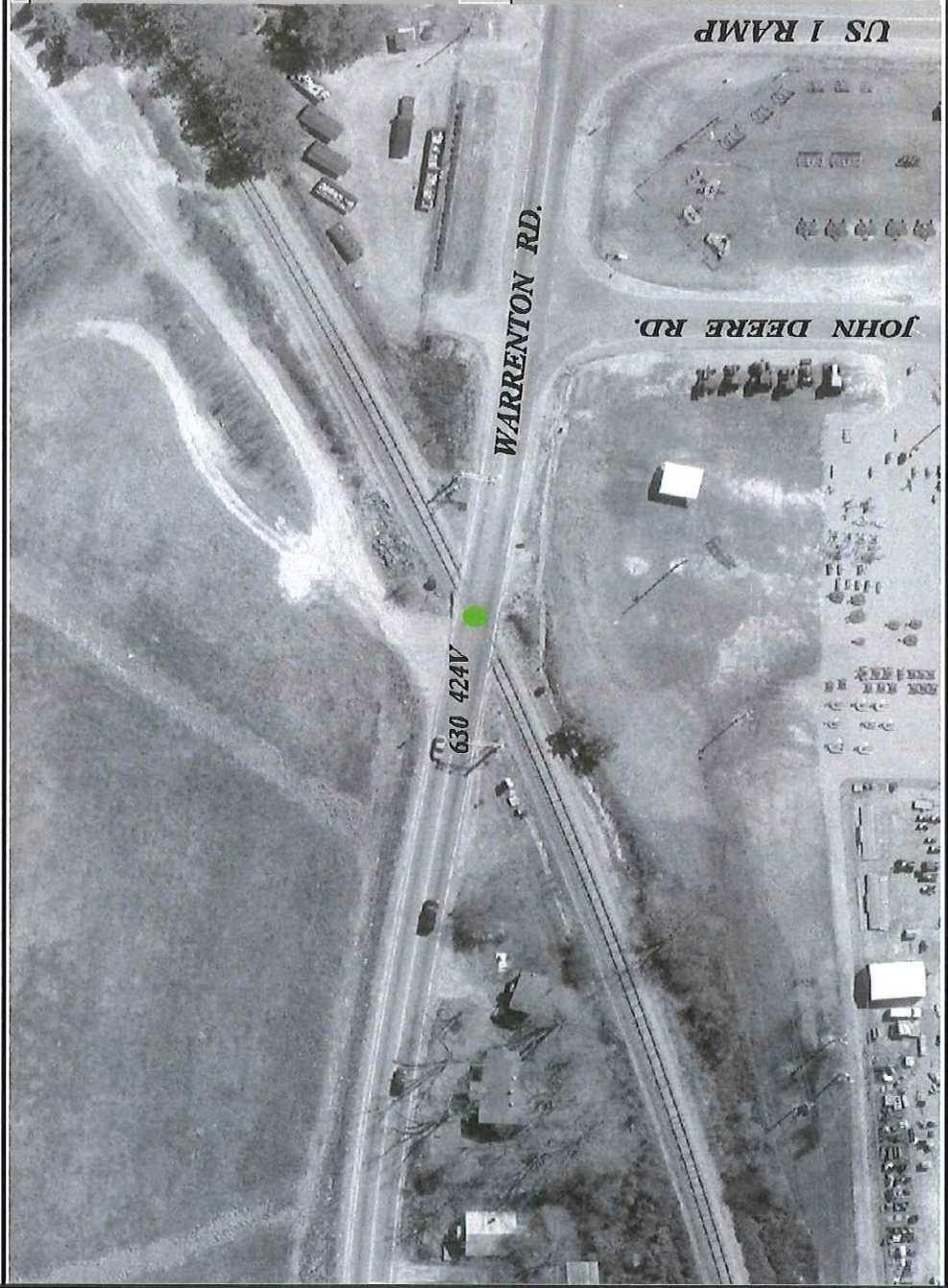


Figure B-5a

Crossing# 630 424V (Warrenton Road)



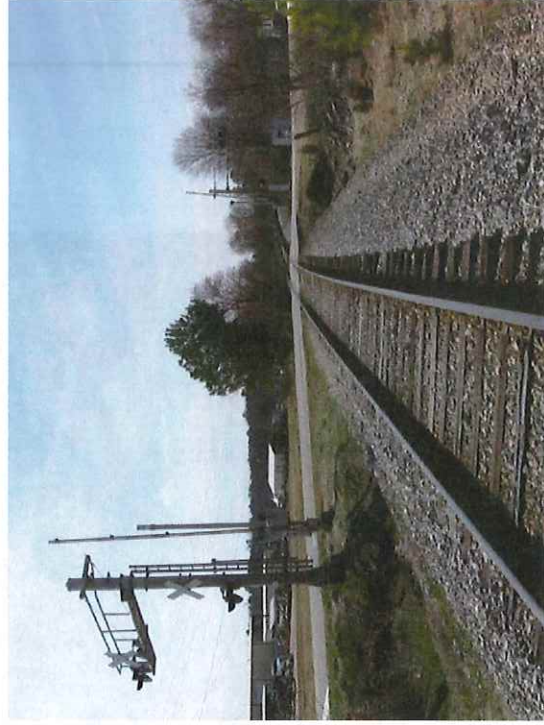
Looking East



Looking North



Looking West



Looking South



| Railroad Street    |     |                           |  |                     |  |                           |  |             |  | Crossing 630 427R |  |
|--------------------|-----|---------------------------|--|---------------------|--|---------------------------|--|-------------|--|-------------------|--|
| 24 Hour ADT        | 250 | Functional Classification |  | Urban Local         |  | Railroad operator         |  | CSX         |  |                   |  |
| 24 Hour Train vol  | 5   | Land Use                  |  | Residential         |  | MP                        |  | 112.45      |  |                   |  |
| Transit Route      | No  | Exist. Warning Device     |  | Crossbucks          |  | Crossing Sight Condition  |  | Poor        |  |                   |  |
| School Bus Route   | Yes | Preemption                |  | N/A                 |  | Redundant Crossing        |  | No          |  |                   |  |
| Truck Route        | No  | Crossing issue            |  | Sight dist., Humped |  | Economic Impact if closed |  | Low         |  |                   |  |
| Bike Route         | No  | Crossing Geometry         |  | Poor                |  | Exposure Index            |  | 1,250       |  |                   |  |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   |  | No                  |  | Accident History          |  | 4, 2-Injury |  |                   |  |

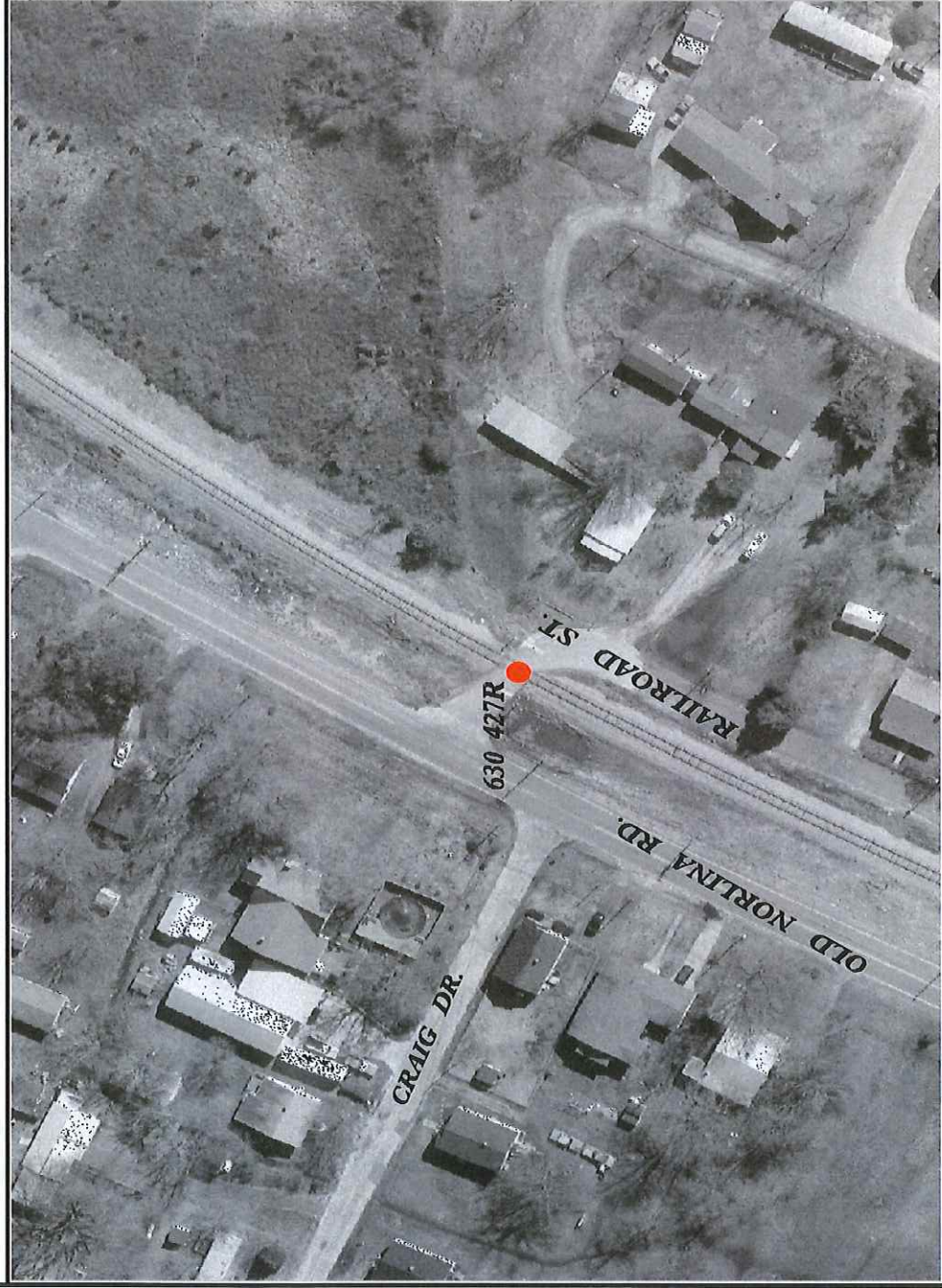


Figure B-6a



## Crossing# 630 427R (Railroad Street)



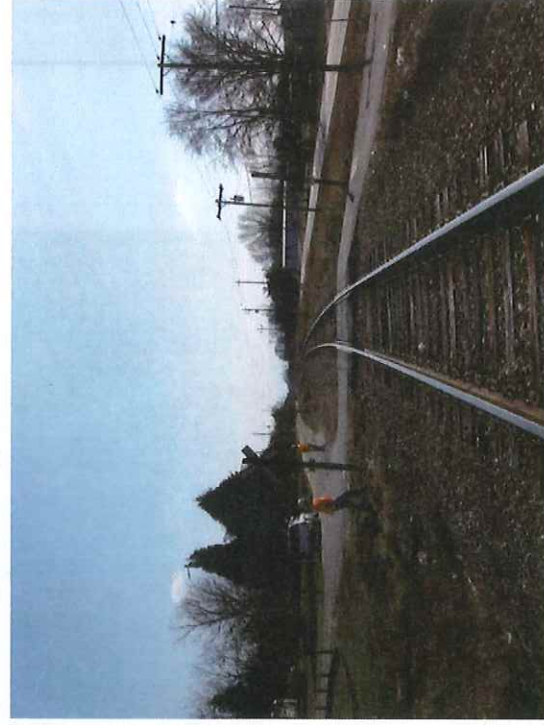
Looking East



Looking North



Looking West



Looking South

| Harris Street      |       |                           |  |                |  |                           |  |        |  | Crossing 630 428X |  |
|--------------------|-------|---------------------------|--|----------------|--|---------------------------|--|--------|--|-------------------|--|
| 24 Hour ADT        | 2,498 | Functional Classification |  | Urban Local    |  | Railroad operator         |  | CSX    |  |                   |  |
| 24 Hour Train vol  | 5     | Land Use                  |  | Industrial     |  | MP                        |  | 112.78 |  |                   |  |
| Transit Route      | No    | Exist. Warning Device     |  | Gates          |  | Crossing Sight Condition  |  | Poor   |  |                   |  |
| School Bus Route   | Yes   | Preemption                |  | N/A            |  | Redundant Crossing        |  | No     |  |                   |  |
| Truck Route        | No    | Crossing issue            |  | Sight distance |  | Economic Impact if closed |  | Med    |  |                   |  |
| Bike Route         | No    | Crossing Geometry         |  | Good           |  | Exposure Index            |  | 12,490 |  |                   |  |
| Emer Serv Critical | N/A   | Need for X-ing Surf Imp   |  | No             |  | Accident History          |  | 1      |  |                   |  |



Figure B-7a



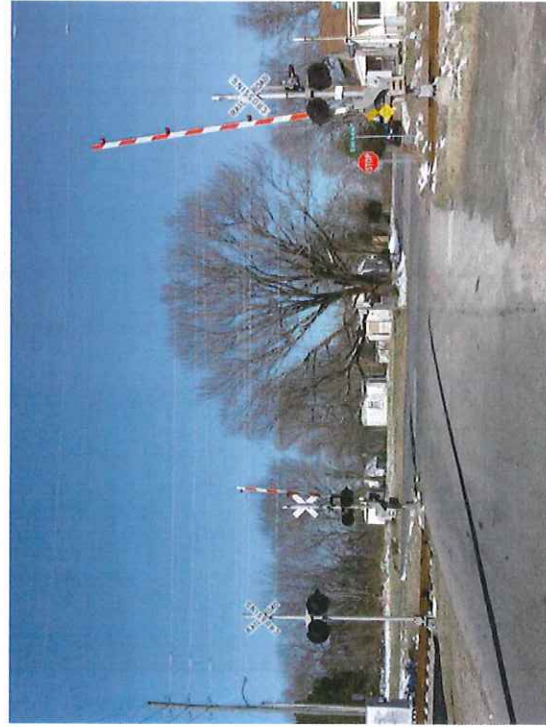
**Crossing# 630 428X (Harris Street)**



Looking East



Looking North



Looking West



Looking South



| Main / Craig Avenue |       |                           |  |                 |  |                           |  |  |  | Crossing 630 429E |
|---------------------|-------|---------------------------|--|-----------------|--|---------------------------|--|--|--|-------------------|
| 24 Hour ADT         | 1,300 | Functional Classification |  | Urban Collector |  | Railroad operator         |  |  |  | CSX               |
| 24 Hour Train vol   | 5     | Land Use                  |  | Industrial      |  | MP                        |  |  |  | 112.94            |
| Transit Route       | No    | Exist. Warning Device     |  | Gates and Cant. |  | Crossing Sight Condition  |  |  |  | Poor              |
| School Bus Route    | Yes   | Preemption                |  | N/A             |  | Redundant Crossing        |  |  |  | No                |
| Truck Route         | No    | Crossing issue            |  | Sight distance  |  | Economic Impact if closed |  |  |  | Low               |
| Bike Route          | No    | Crossing Geometry         |  | Poor            |  | Exposure Index            |  |  |  | 6,500             |
| Emer Serv Critical  | N/A   | Need for X-ing Surf Imp   |  | Yes             |  | Accident History          |  |  |  | N/A               |

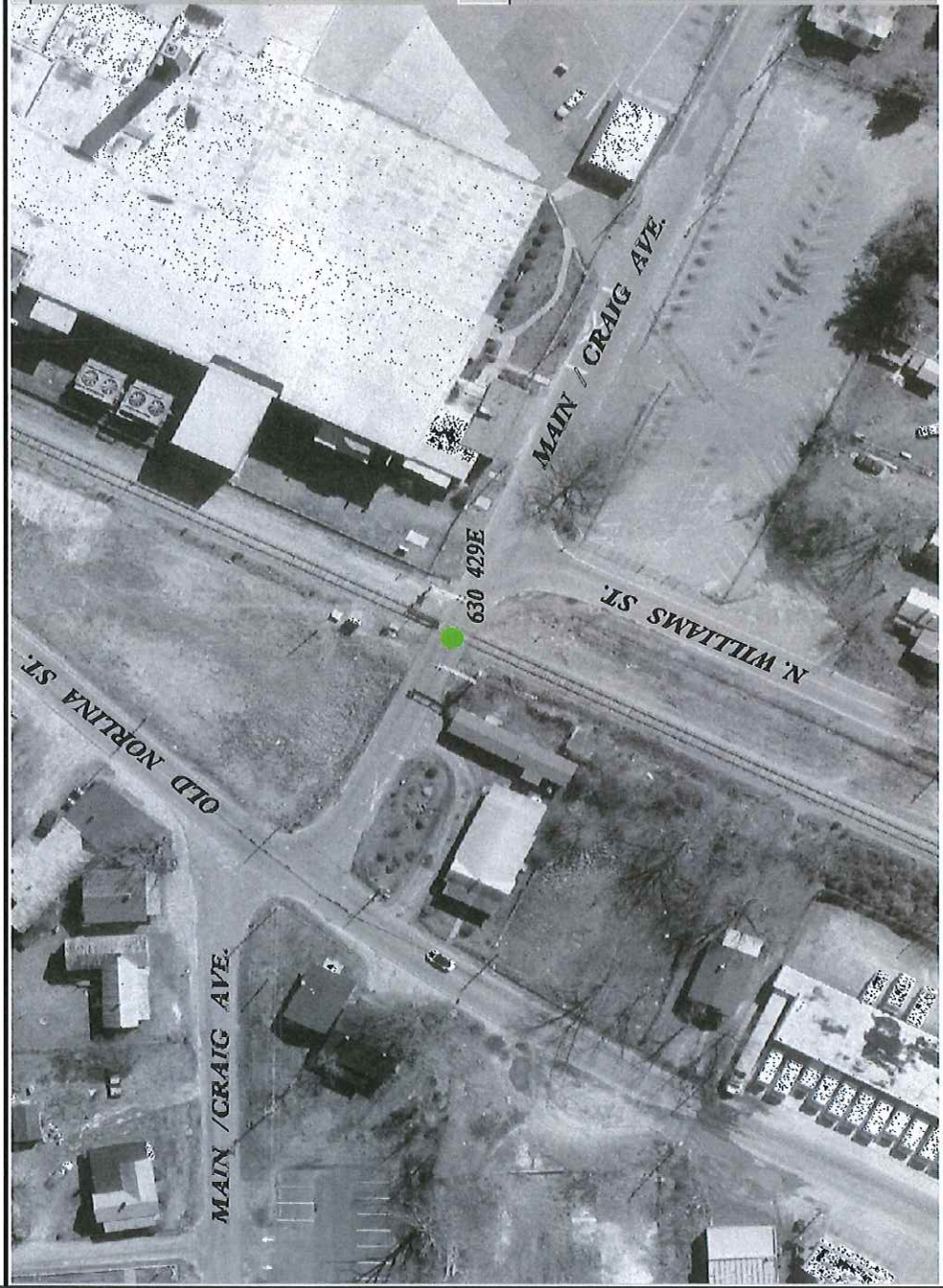


Figure B-8a



**Crossing# 630 429E (Main/Craig Avenue)**



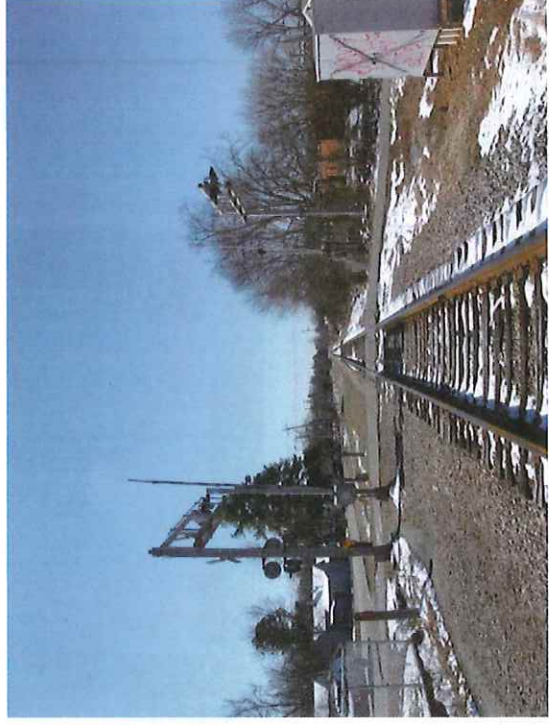
Looking East



Looking North



Looking West



Looking South

| Carter's Crossing  |       |                           |  |             |  |                           |  |        |  | Crossing 630 432M |
|--------------------|-------|---------------------------|--|-------------|--|---------------------------|--|--------|--|-------------------|
| 24 Hour ADT        | 1,144 | Functional Classification |  | Rural Local |  | Railroad operator         |  | CSX    |  |                   |
| 24 Hour Train vol  | 5     | Land Use                  |  | Residential |  | MP                        |  | 113.16 |  |                   |
| Transit Route      | No    | Exist. Warning Device     |  | Flashers    |  | Crossing Sight Condition  |  | Good   |  |                   |
| School Bus Route   | No    | Preemption                |  | N/A         |  | Redundant Crossing        |  | No     |  |                   |
| Truck Route        | No    | Crossing issue            |  | Humped      |  | Economic Impact if closed |  | Low    |  |                   |
| Bike Route         | No    | Crossing Geometry         |  | Fair        |  | Exposure Index            |  | 5,720  |  |                   |
| Emer Serv Critical | N/A   | Need for X-ing Surf Imp   |  | No          |  | Accident History          |  | N/A    |  |                   |

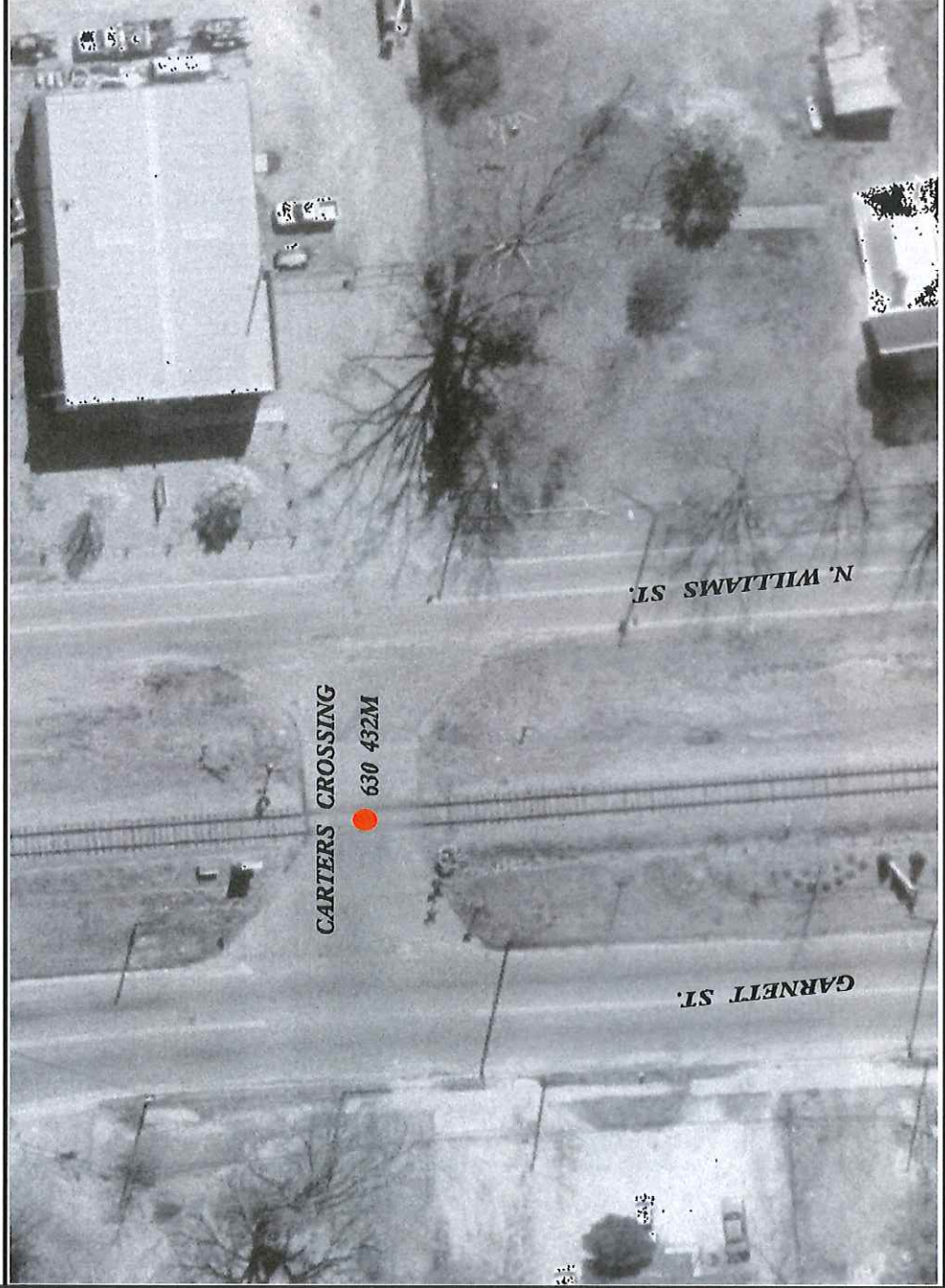


Figure B-9a



# Crossing# 630 432M (Carter's Crossing)



Looking East



Looking North



Looking West



Looking South



| Rock Spring Street |       |                           |  |             |  |                           |  |               |  | Crossing 630 433U |  |
|--------------------|-------|---------------------------|--|-------------|--|---------------------------|--|---------------|--|-------------------|--|
| 24 Hour ADT        | 3,707 | Functional Classification |  | Urban Local |  | Railroad operator         |  | CSX           |  |                   |  |
| 24 Hour Train vol  | 5     | Land Use                  |  | Commercial  |  | MP                        |  | 113.4         |  |                   |  |
| Transit Route      | No    | Exist. Warning Device     |  | Gates       |  | Crossing Sight Condition  |  | Good          |  |                   |  |
| School Bus Route   | Yes   | Preemption                |  | N/A         |  | Redundant Crossing        |  | No            |  |                   |  |
| Truck Route        | No    | Crossing issue            |  | None        |  | Economic Impact if closed |  | Med           |  |                   |  |
| Bike Route         | No    | Crossing Geometry         |  | Good        |  | Exposure Index            |  | 18,535        |  |                   |  |
| Emer Serv Critical | N/A   | Need for X-ing Surf Imp   |  | No          |  | Accident History          |  | 5, 4 injuries |  |                   |  |



Figure B-10a



# Crossing# 630 433U (Rock Spring Street)



Looking East



Looking North



Looking West



Looking South



| Andrews Avenue     |        |                           |  |  |                            |  |  |                           |  | Crossing 630 483X |  |
|--------------------|--------|---------------------------|--|--|----------------------------|--|--|---------------------------|--|-------------------|--|
| 24 Hour ADT        | 15,000 | Functional Classification |  |  | Urban Other Principal Art. |  |  | Railroad operator         |  | CSX               |  |
| 24 Hour Train vol  | 5      | Land Use                  |  |  | Commercial                 |  |  | MP                        |  | 113.58            |  |
| Transit Route      | No     | Exist. Warning Device     |  |  | Gates and Cant.            |  |  | Crossing Sight Condition  |  | Poor              |  |
| School Bus Route   | Yes    | Preemption                |  |  | Yes                        |  |  | Redundant Crossing        |  | No                |  |
| Truck Route        | Yes    | Crossing issue            |  |  | Sight dist, Humped         |  |  | Economic Impact if closed |  | High              |  |
| Bike Route         | No     | Crossing Geometry         |  |  | Good                       |  |  | Exposure Index            |  | 75,000            |  |
| Emer Serv Critical | N/A    | Need for X-ing Surf Imp   |  |  | Yes                        |  |  | Accident History          |  | 4                 |  |

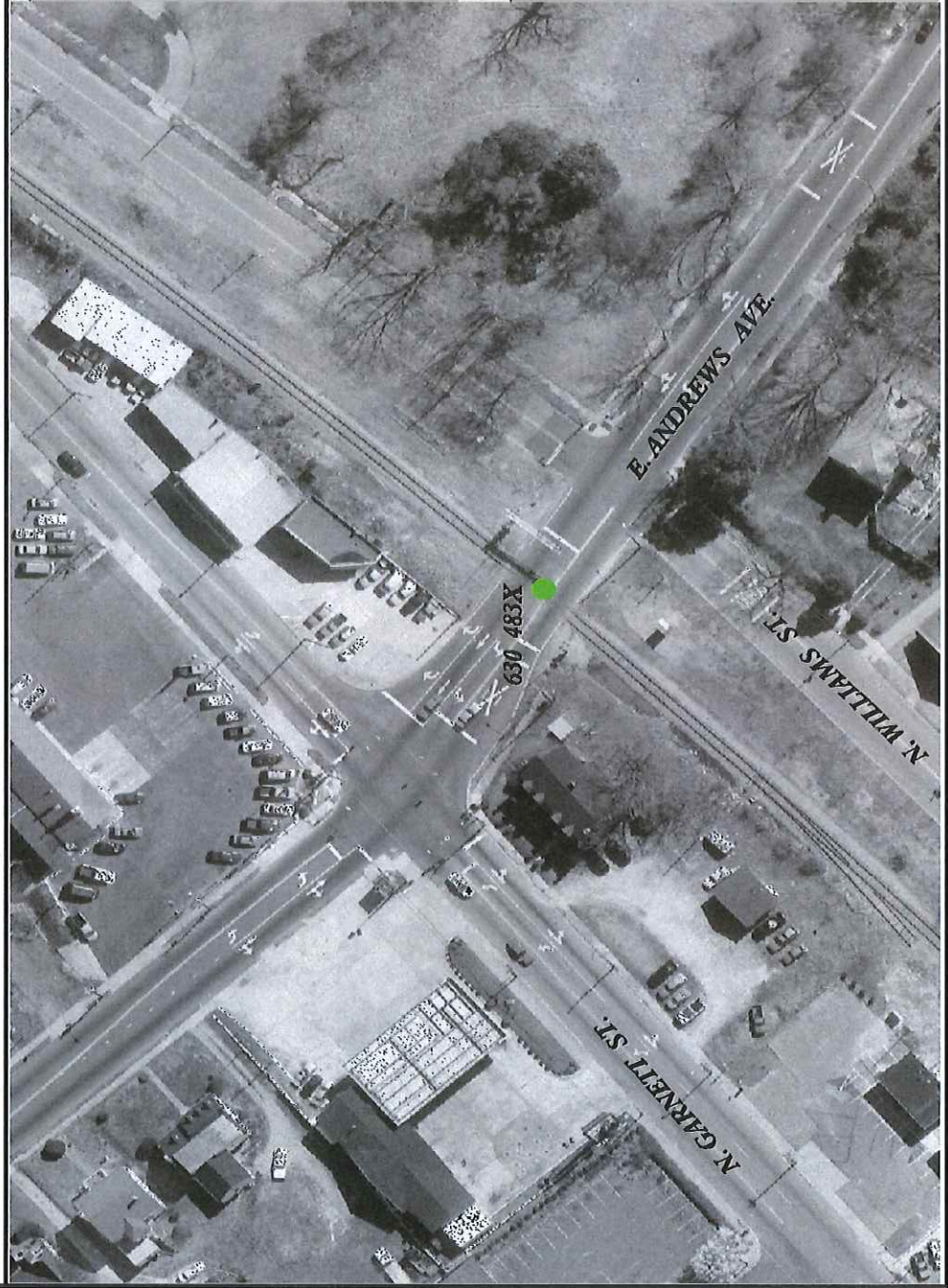


Figure B-11a



## Crossing# 630 483X (Andrews Avenue)



Looking East



Looking North



Looking West



Looking South



| Montgomery Street  |       |                           |  |                 |  |                           |  |               |  | Crossing 630 485L |  |  |
|--------------------|-------|---------------------------|--|-----------------|--|---------------------------|--|---------------|--|-------------------|--|--|
| 24 Hour ADT        | 2,954 | Functional Classification |  | Urban Collector |  | Railroad operator         |  | CSX           |  |                   |  |  |
| 24 Hour Train vol  | 5     | Land Use                  |  | Commercial      |  | MP                        |  | 113.84        |  |                   |  |  |
| Transit Route      | No    | Exist. Warning Device     |  | Gates and Cant. |  | Crossing Sight Condition  |  | Poor          |  |                   |  |  |
| School Bus Route   | Yes   | Preemption                |  | N/A             |  | Redundant Crossing        |  | No            |  |                   |  |  |
| Truck Route        | No    | Crossing issue            |  | Sight distance  |  | Economic Impact if closed |  | Med           |  |                   |  |  |
| Bike Route         | No    | Crossing Geometry         |  | Good            |  | Exposure Index            |  | 14,770        |  |                   |  |  |
| Emer Serv Critical | N/A   | Need for X-ing Surf Imp   |  | No              |  | Accident History          |  | 1, 1 fatality |  |                   |  |  |

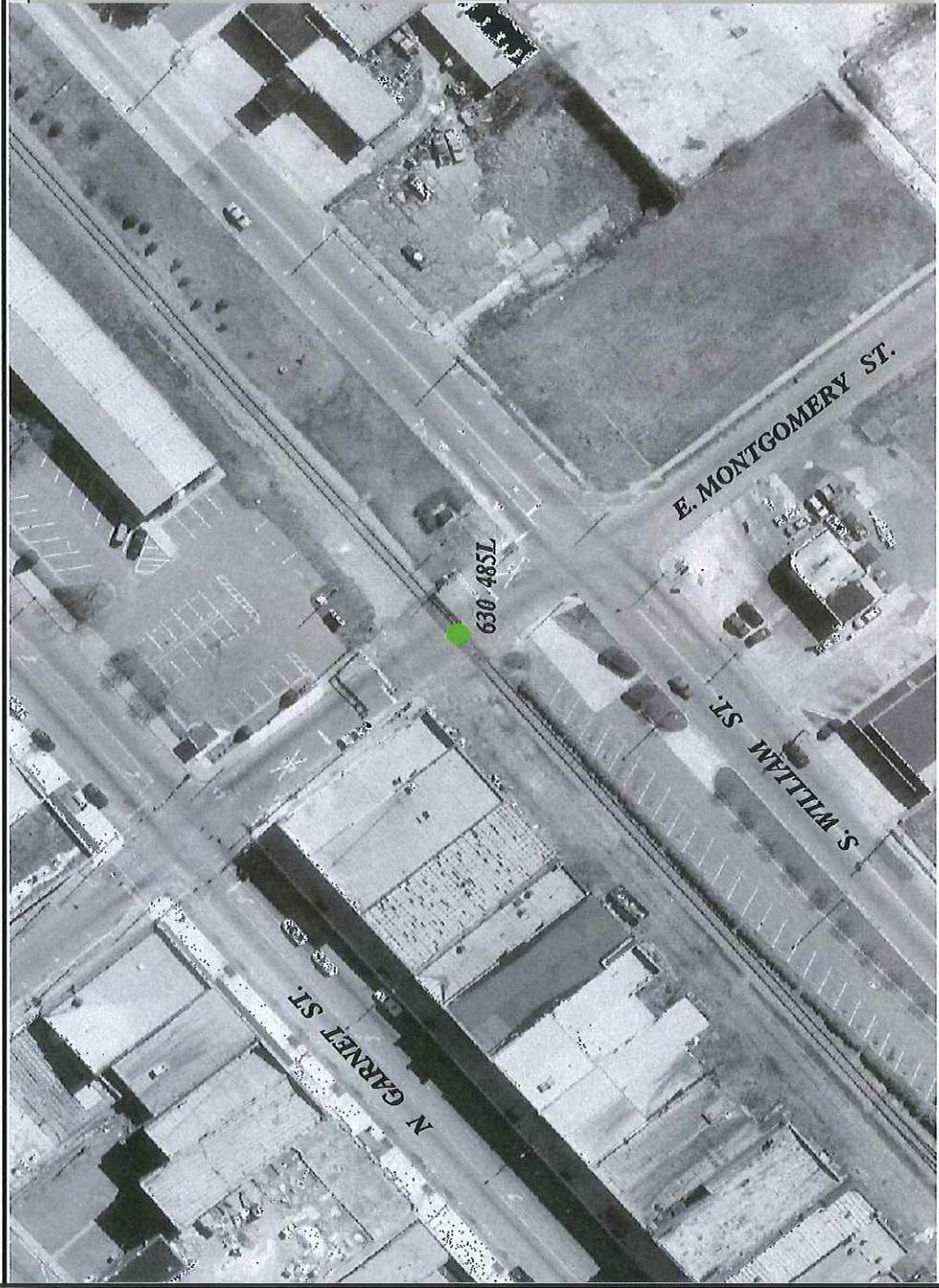


Figure B-12a

Crossing# 630 485L (Montgomery Street)



Looking East



Looking North



Looking West



Looking South



| Winder Street      |     |                           |                      |                           | Crossing 630 486T |  |
|--------------------|-----|---------------------------|----------------------|---------------------------|-------------------|--|
| 24 Hour ADT        | 881 | Functional Classification | Urban Minor Arterial | Railroad operator         | CSX               |  |
| 24 Hour Train vol  | 5   | Land Use                  | Commercial           | MP                        | 113.98            |  |
| Transit Route      | No  | Exist. Warning Device     | Gates and Cant.      | Crossing Sight Condition  | Poor              |  |
| School Bus Route   | No  | Preemption                | N/A                  | Redundant Crossing        | No                |  |
| Truck Route        | No  | Crossing issue            | Sight dist., Humped  | Economic Impact if closed | Med               |  |
| Bike Route         | No  | Crossing Geometry         | Good                 | Exposure Index            | 4,405             |  |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   | No                   | Accident History          | 2                 |  |

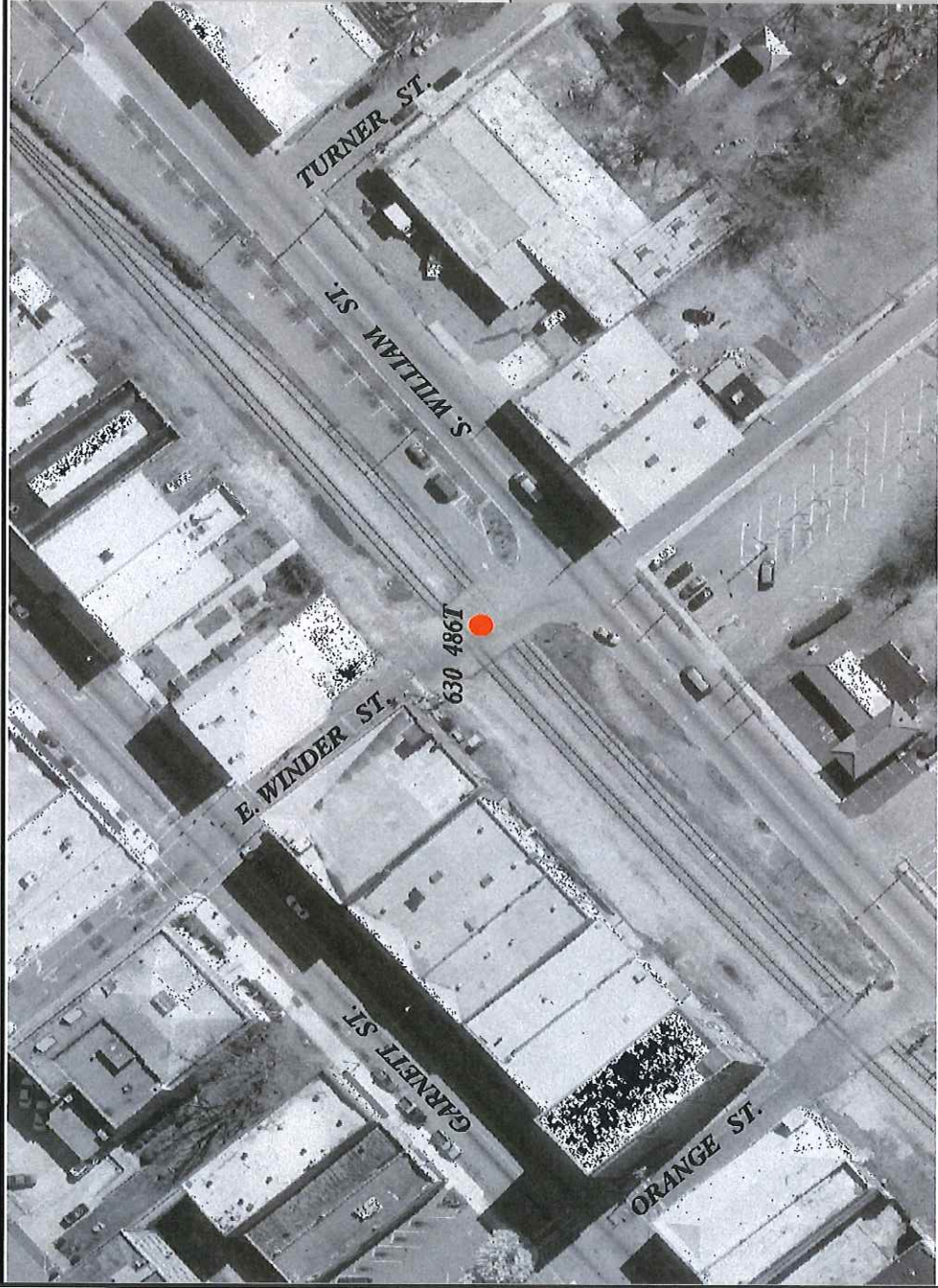


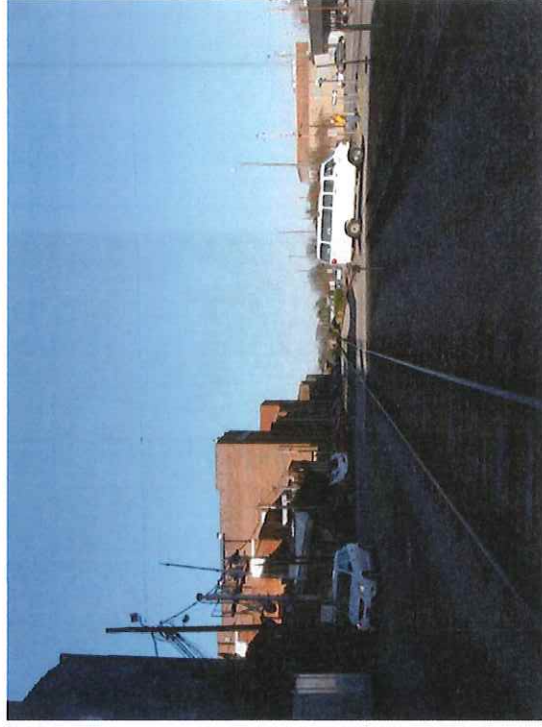
Figure B-13a



# Crossing# 630 486T (Winder Street)



Looking East



Looking North



Looking West



Looking South

| Orange Street      |     |                           |  |                      |  |                           |  |        |  | Crossing 630 487A |  |  |
|--------------------|-----|---------------------------|--|----------------------|--|---------------------------|--|--------|--|-------------------|--|--|
| 24 Hour ADT        | 606 | Functional Classification |  | Urban Minor Arterial |  | Railroad operator         |  | CSX    |  |                   |  |  |
| 24 Hour Train vol  | 5   | Land Use                  |  | Commercial           |  | MP                        |  | 114.05 |  |                   |  |  |
| Transit Route      | No  | Exist. Warning Device     |  | Gates                |  | Crossing Sight Condition  |  | Fair   |  |                   |  |  |
| School Bus Route   | No  | Preemption                |  | N/A                  |  | Redundant Crossing        |  | No     |  |                   |  |  |
| Truck Route        | No  | Crossing issue            |  | Sight dist., Humped  |  | Economic Impact if closed |  | Med    |  |                   |  |  |
| Bike Route         | No  | Crossing Geometry         |  | Fair                 |  | Exposure Index            |  | 3,030  |  |                   |  |  |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   |  | No                   |  | Accident History          |  | N/A    |  |                   |  |  |

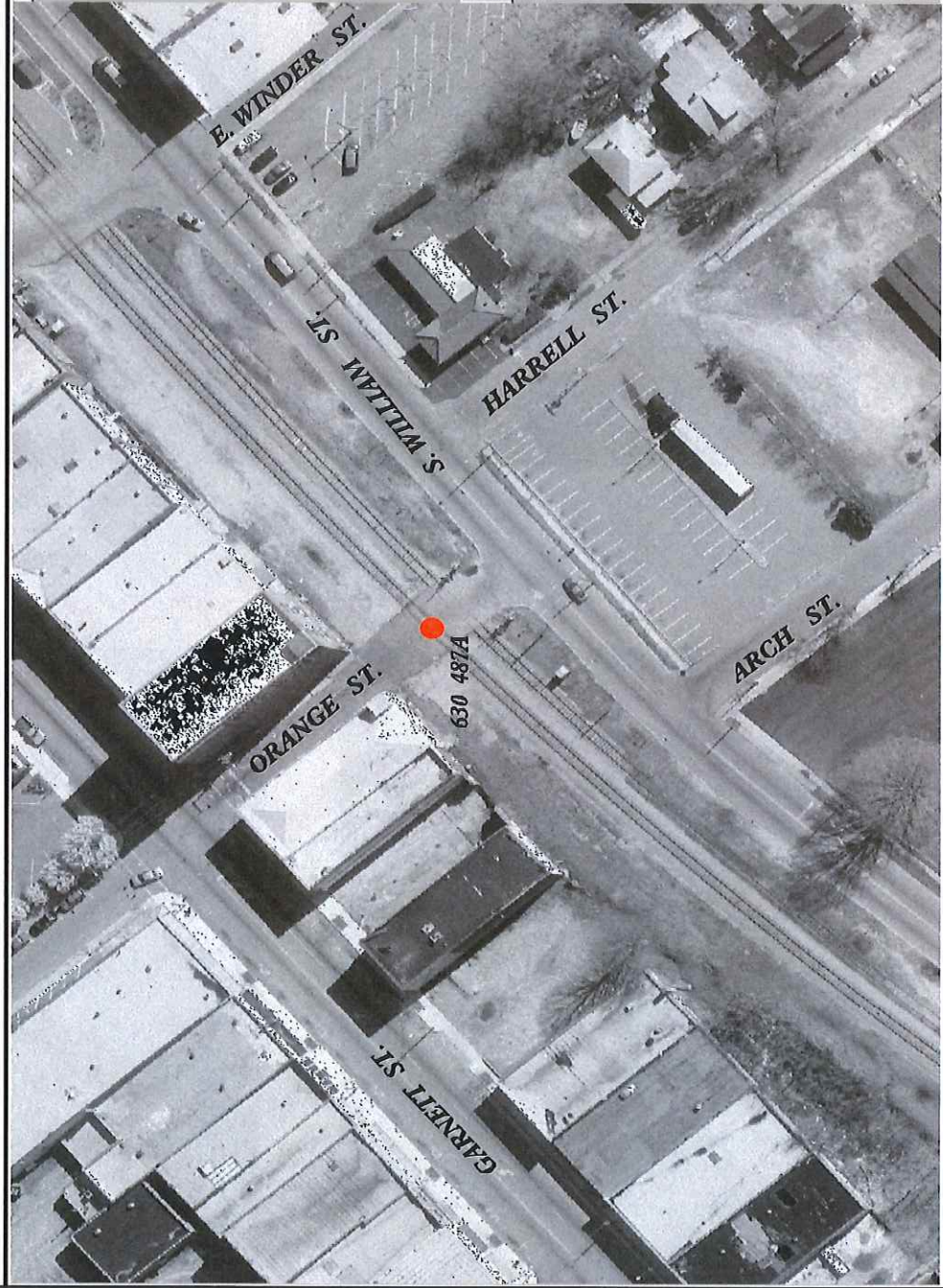


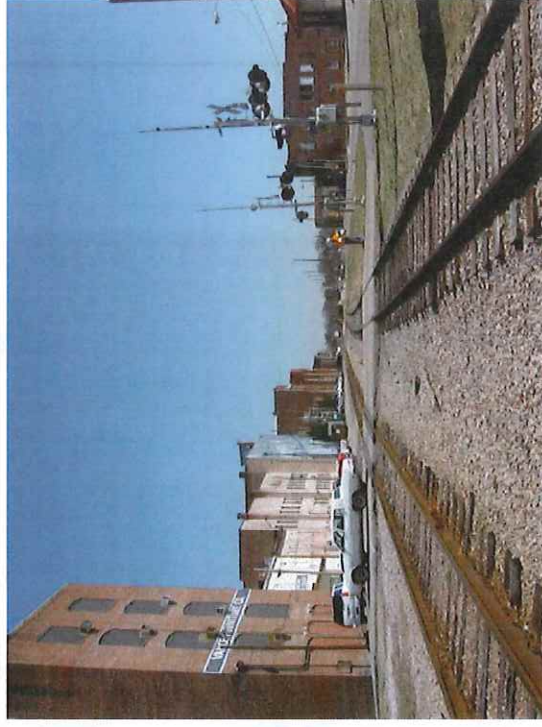
Figure B-14a



## Crossing# 630 487A (Orange Street)



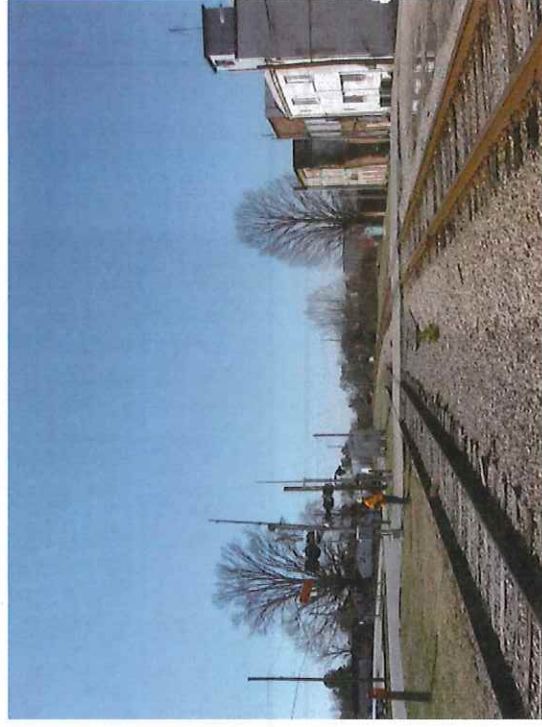
Looking East



Looking North



Looking West



Looking South



| Spring Street      |       |                           |  |                     |  |                           |  |        |  | Crossing 630 488G |  |
|--------------------|-------|---------------------------|--|---------------------|--|---------------------------|--|--------|--|-------------------|--|
| 24 Hour ADT        | 1,100 | Functional Classification |  | Urban Local         |  | Railroad operator         |  | CSX    |  |                   |  |
| 24 Hour Train vol  | 5     | Land Use                  |  | Commercial          |  | MP                        |  | 114.17 |  |                   |  |
| Transit Route      | No    | Exist. Warning Device     |  | Gates and Cant.     |  | Crossing Sight Condition  |  | Poor   |  |                   |  |
| School Bus Route   | No    | Preemption                |  | N/A                 |  | Redundant Crossing        |  | No     |  |                   |  |
| Truck Route        | No    | Crossing issue            |  | Sight dist., Humped |  | Economic Impact if closed |  | Med    |  |                   |  |
| Bike Route         | No    | Crossing Geometry         |  | Fair                |  | Exposure Index            |  | 5,500  |  |                   |  |
| Emer Serv Critical | N/A   | Need for X-ing Surf Imp   |  | No                  |  | Accident History          |  | 1      |  |                   |  |

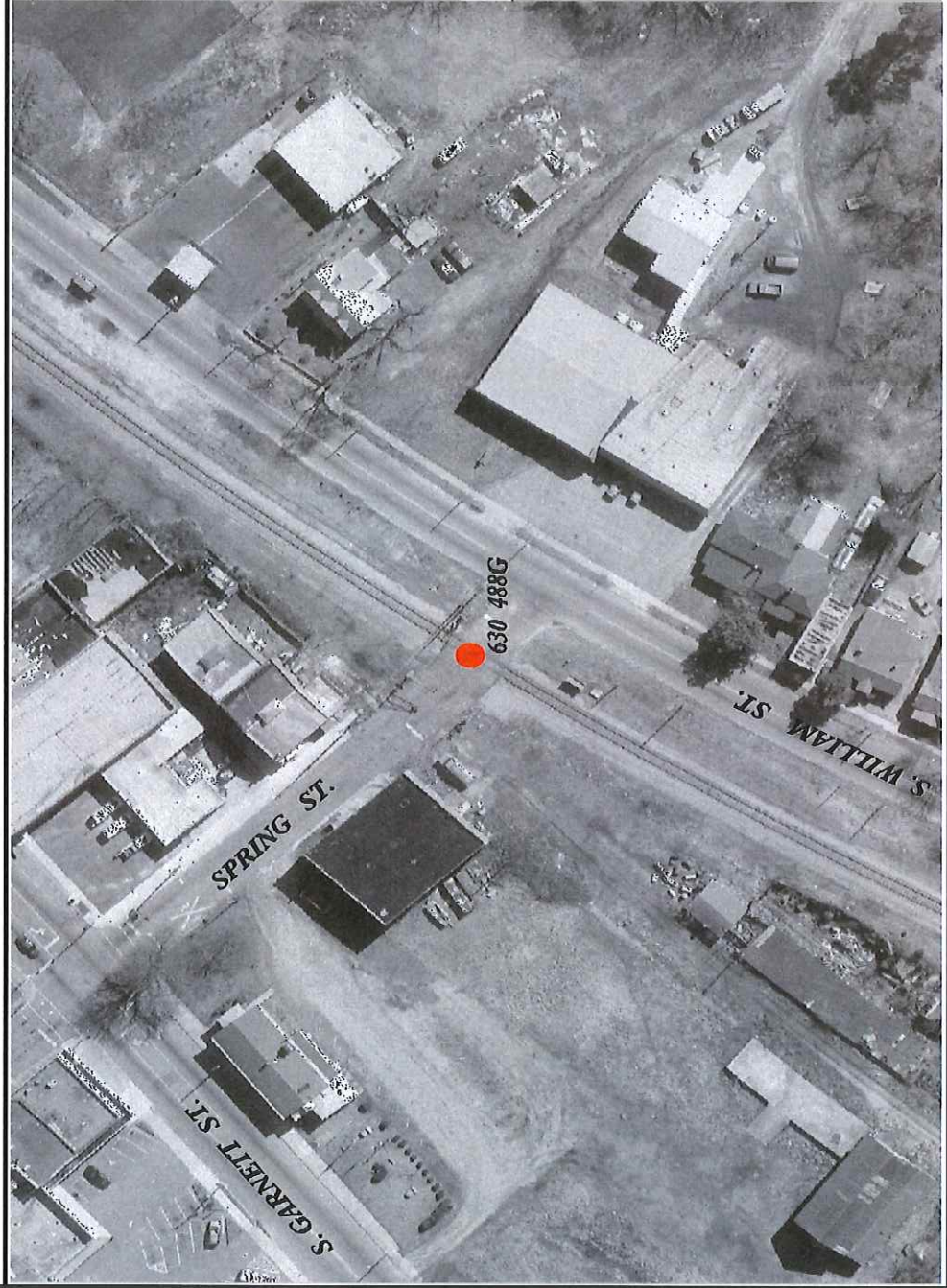
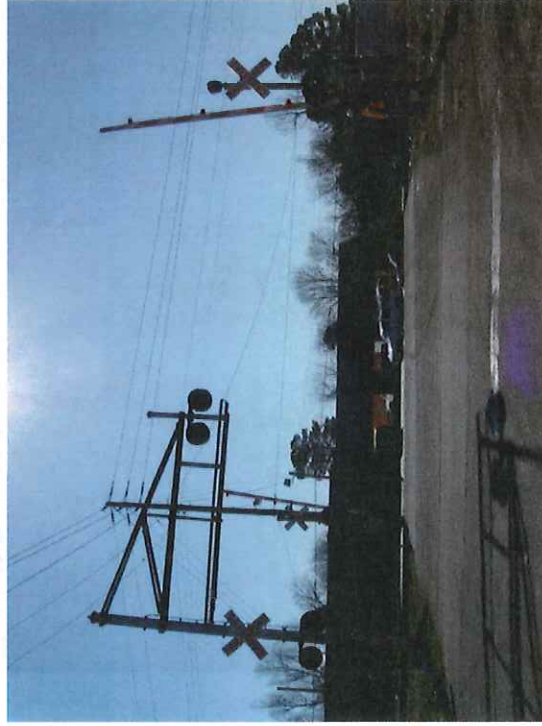


Figure B-15a

# Crossing# 630 488G (Spring Street)



Looking East



Looking North



Looking West



Looking South



| Chavasse Avenue    |       |                           |  |                      |  |                           |  |        |  | Crossing 630 489N |  |
|--------------------|-------|---------------------------|--|----------------------|--|---------------------------|--|--------|--|-------------------|--|
| 24 Hour ADT        | 7,400 | Functional Classification |  | Urban Minor Arterial |  | Railroad operator         |  | CSX    |  |                   |  |
| 24 Hour Train vol  | 5     | Land Use                  |  | Commercial           |  | MP                        |  | 114.42 |  |                   |  |
| Transit Route      | No    | Exist. Warning Device     |  | Gates                |  | Crossing Sight Condition  |  | Poor   |  |                   |  |
| School Bus Route   | Yes   | Preemption                |  | Yes                  |  | Redundant Crossing        |  | No     |  |                   |  |
| Truck Route        | No    | Crossing issue            |  | Sight dist., Humped  |  | Economic Impact if closed |  | Med    |  |                   |  |
| Bike Route         | No    | Crossing Geometry         |  | Good                 |  | Exposure Index            |  | 37,000 |  |                   |  |
| Emer Serv Critical | N/A   | Need for X-ing Surf Imp   |  | Yes                  |  | Accident History          |  | 1      |  |                   |  |

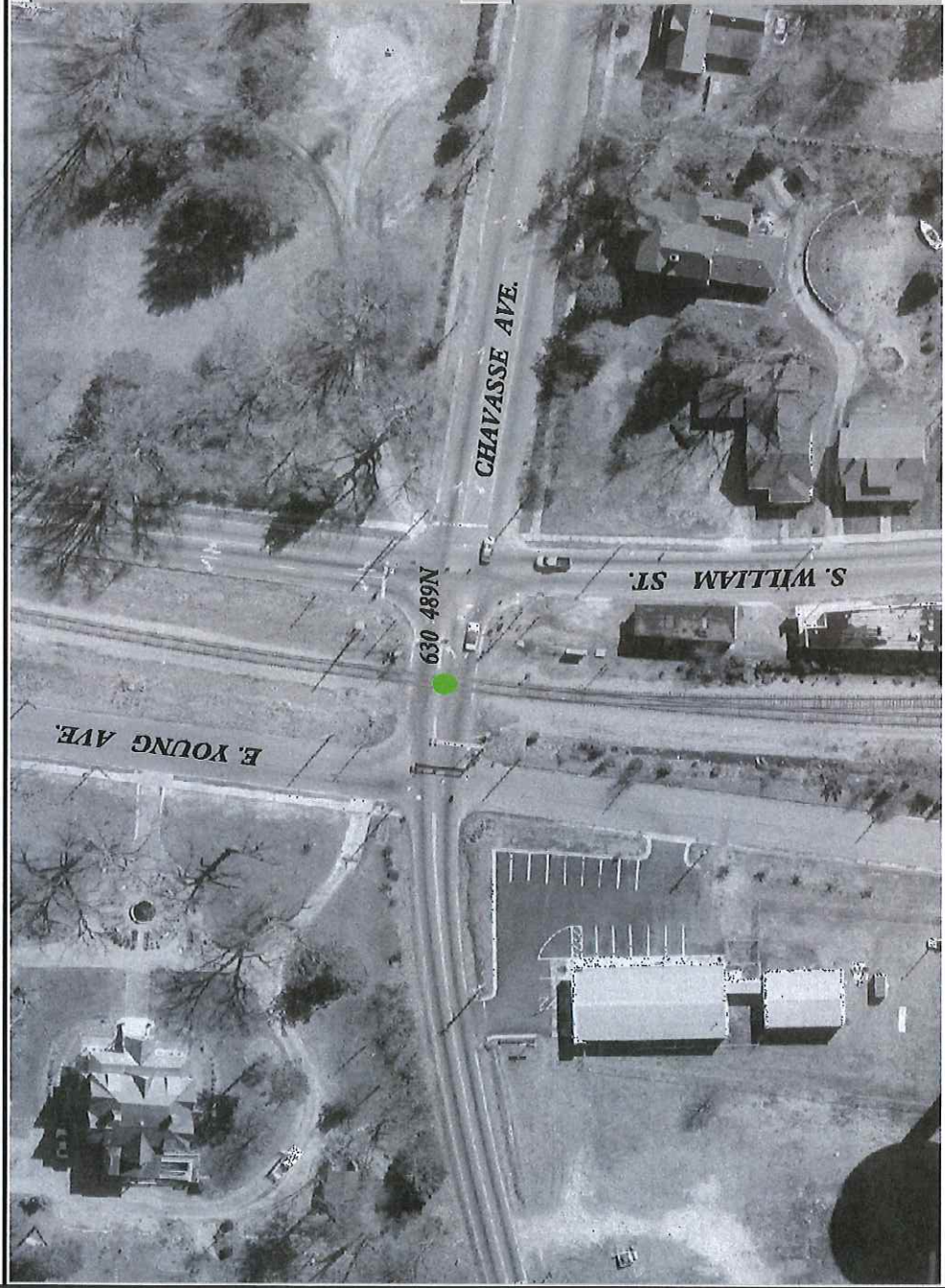


Figure B-16a



# Crossing# 630 489N (Chavasse Avenue)



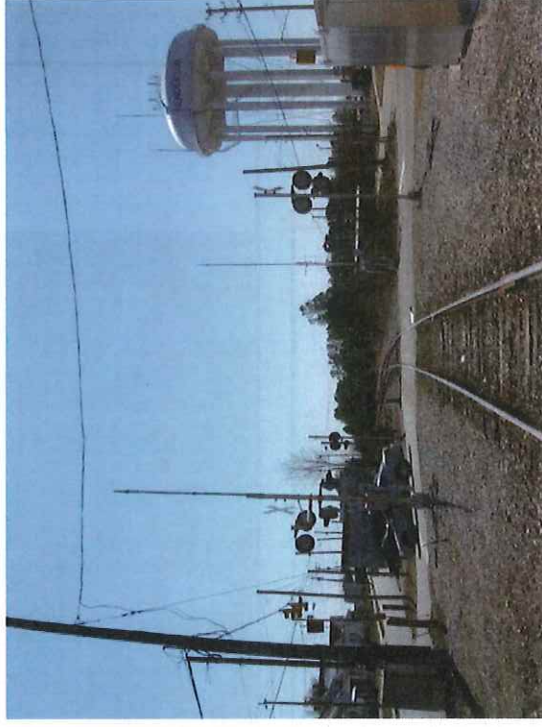
Looking East



Looking North



Looking West



Looking South



| St. Matthews Street |       |                           |  |                 |  |                           |  |        |  | Crossing 630 494K |  |  |
|---------------------|-------|---------------------------|--|-----------------|--|---------------------------|--|--------|--|-------------------|--|--|
| 24 Hour ADT         | 4,687 | Functional Classification |  | Urban Local     |  | Railroad operator         |  | CSX    |  |                   |  |  |
| 24 Hour Train vol   | 5     | Land Use                  |  | Industrial      |  | MP                        |  | 115.26 |  |                   |  |  |
| Transit Route       | No    | Exist. Warning Device     |  | Gates and Cant. |  | Crossing Sight Condition  |  | Poor   |  |                   |  |  |
| School Bus Route    | Yes   | Preemption                |  | N/A             |  | Redundant Crossing        |  | No     |  |                   |  |  |
| Truck Route         | No    | Crossing issue            |  | Sight dist      |  | Economic Impact if closed |  | Med    |  |                   |  |  |
| Bike Route          | No    | Crossing Geometry         |  | Fair            |  | Exposure Index            |  | 23,435 |  |                   |  |  |
| Emer Serv Critical  | N/A   | Need for X-ing Surf Imp   |  | No              |  | Accident History          |  | N/A    |  |                   |  |  |

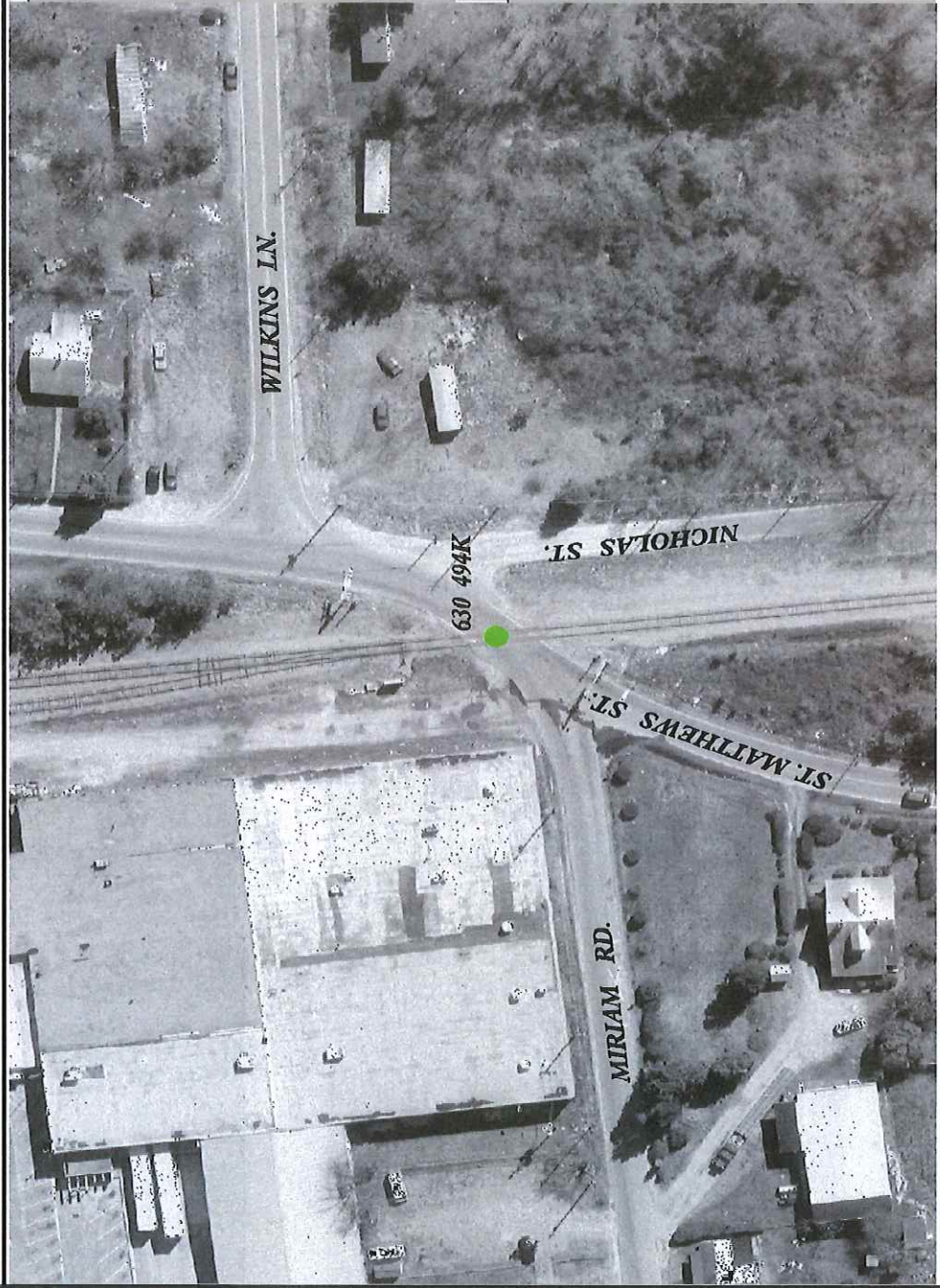


Figure B-17a

**Crossing# 630 494K (St. Matthews Street)**



Looking East



Looking North



Looking West



Looking South



| Welcome Avenue     |  |       |                           |  |                |  |                           |  |        | Crossing 630 495S |  |
|--------------------|--|-------|---------------------------|--|----------------|--|---------------------------|--|--------|-------------------|--|
| 24 Hour ADT        |  | 3,600 | Functional Classification |  | Urban Local    |  | Railroad operator         |  | CSX    |                   |  |
| 24 Hour Train vol  |  | 5     | Land Use                  |  | Residential    |  | MP                        |  | 115.78 |                   |  |
| Transit Route      |  | No    | Exist. Warning Device     |  | Gates          |  | Crossing Sight Condition  |  | Poor   |                   |  |
| School Bus Route   |  | Yes   | Preemption                |  | N/A            |  | Redundant Crossing        |  | No     |                   |  |
| Truck Route        |  | No    | Crossing issue            |  | Sight distance |  | Economic Impact if closed |  | Med    |                   |  |
| Bike Route         |  | No    | Crossing Geometry         |  | Good           |  | Exposure Index            |  | 18,000 |                   |  |
| Emer Serv Critical |  | N/A   | Need for X-ing Surf Imp   |  | No             |  | Accident History          |  | 4      |                   |  |

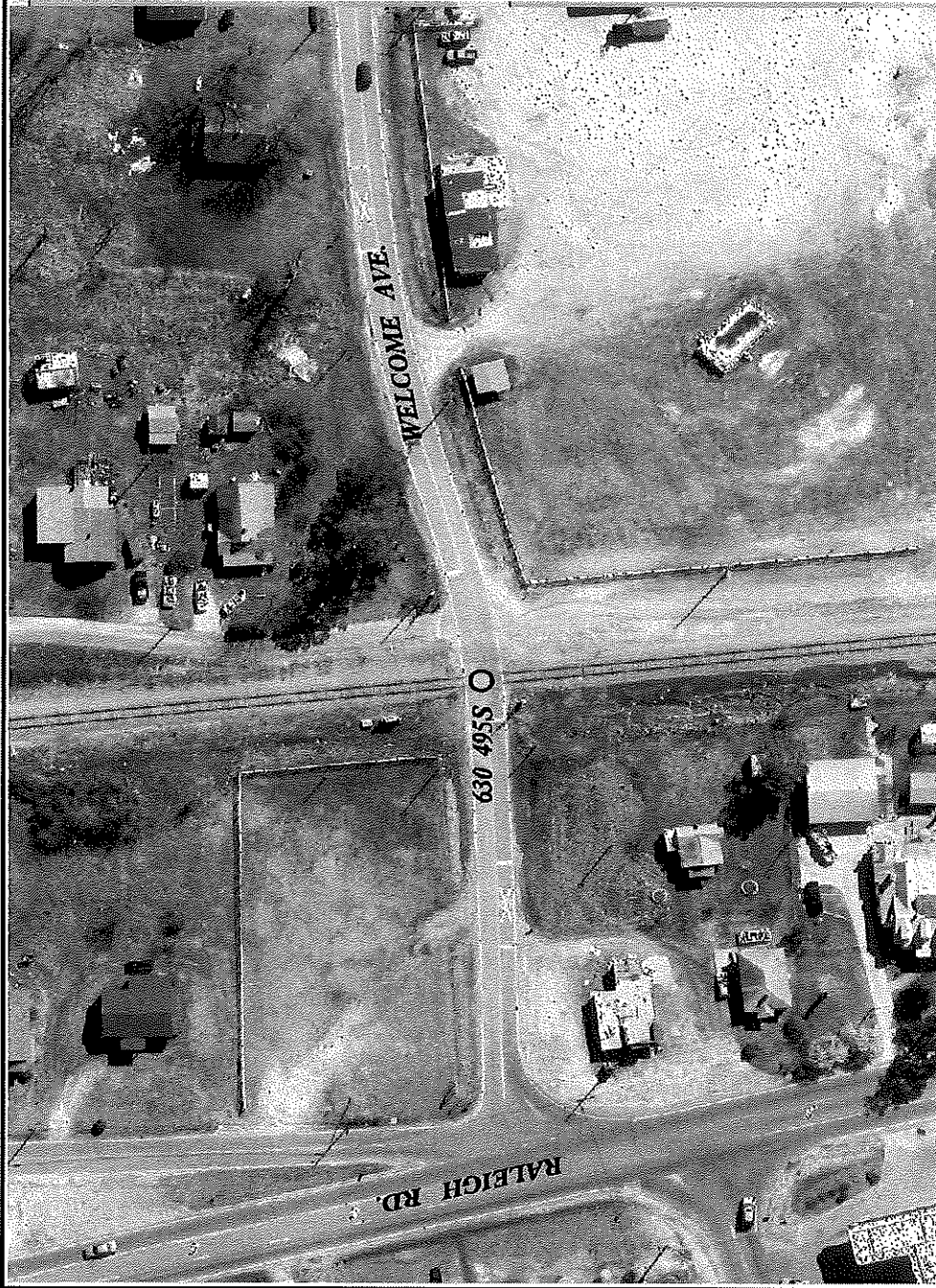


Figure B-18a

**Crossing# 630 495S (Welcome Avenue)**



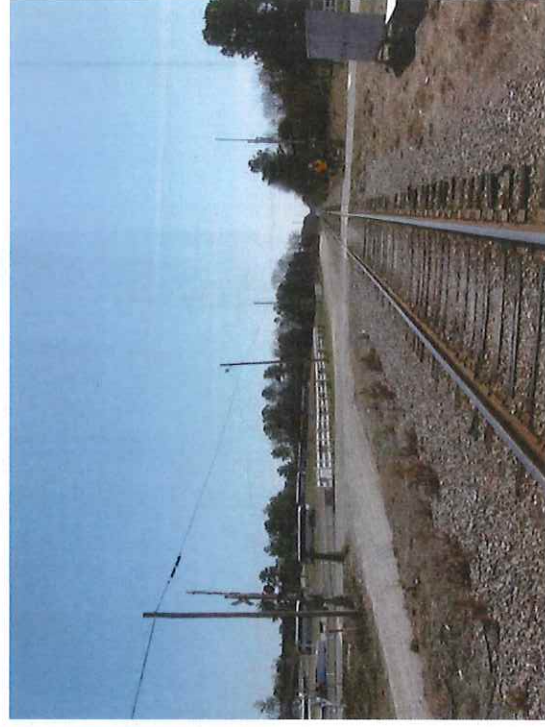
Looking East



Looking North



Looking West



Looking South



| J. P. Taylor Road  |  |       |                           |  |                |  |                           |  |  | Crossing 630 497F |  |
|--------------------|--|-------|---------------------------|--|----------------|--|---------------------------|--|--|-------------------|--|
| 24 Hour ADT        |  | 3,700 | Functional Classification |  | Urban Local    |  | Railroad operator         |  |  | CSX               |  |
| 24 Hour Train vol  |  | 5     | Land Use                  |  | Industrial     |  | MP                        |  |  | 116.13            |  |
| Transit Route      |  | No    | Exist. Warning Device     |  | Gates          |  | Crossing Sight Condition  |  |  | Poor              |  |
| School Bus Route   |  | Yes   | Preemption                |  | N/A            |  | Redundant Crossing        |  |  | No                |  |
| Truck Route        |  | No    | Crossing issue            |  | Sight distance |  | Economic Impact if closed |  |  | High              |  |
| Bike Route         |  | No    | Crossing Geometry         |  | Good           |  | Exposure Index            |  |  | 18,500            |  |
| Emer Serv Critical |  | N/A   | Need for X-ing Surf Imp   |  | No             |  | Accident History          |  |  | 6, 4-Injury       |  |

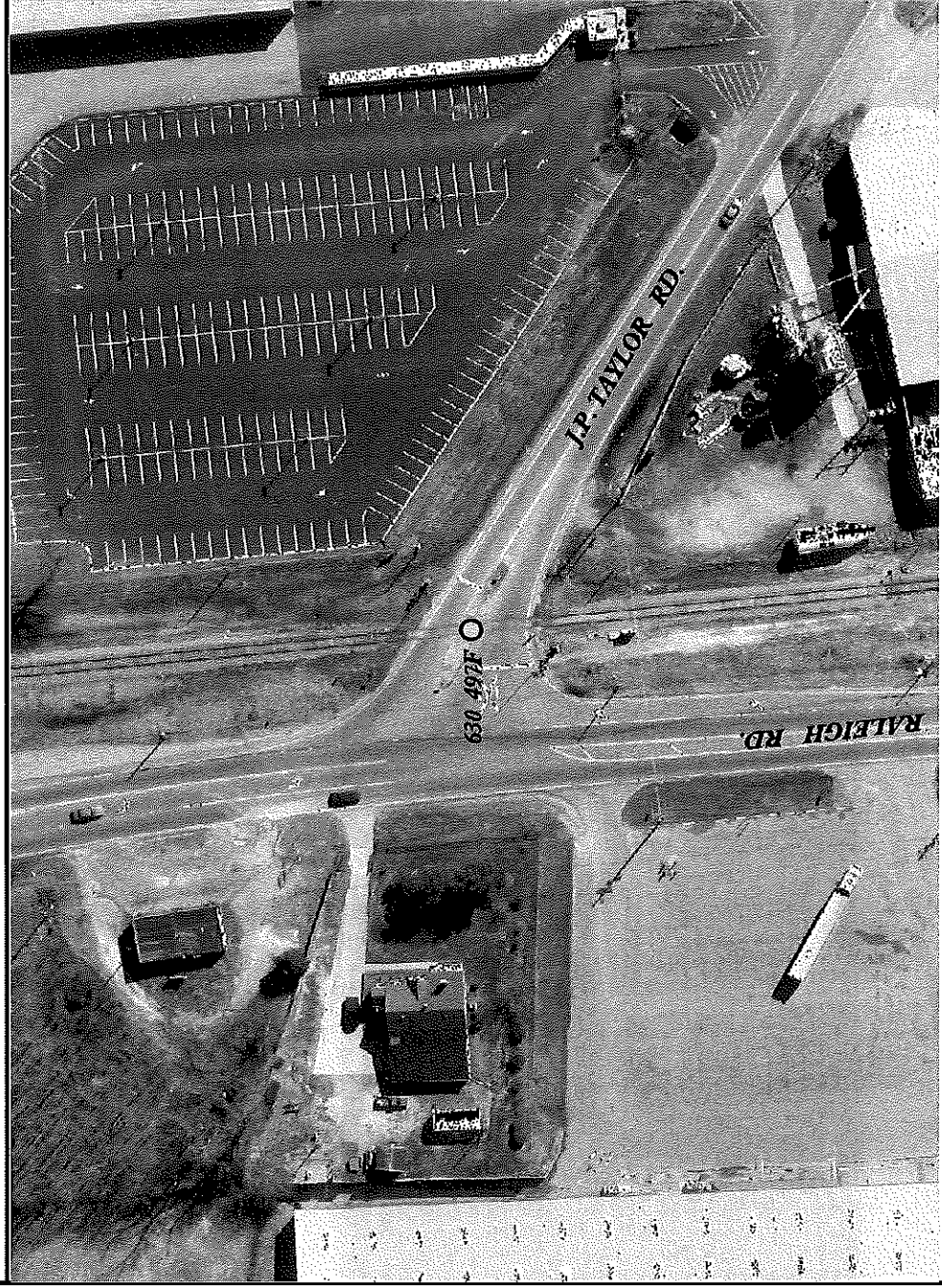


Figure B-19a

**Crossing# 630 497F (J.P. Taylor Road)**



Looking East



Looking North



Looking West



Looking South



| Warehouse Road     |     |                           |  |             |  |                           |  |  |  | Crossing 630 498M |  |  |
|--------------------|-----|---------------------------|--|-------------|--|---------------------------|--|--|--|-------------------|--|--|
| 24 Hour ADT        | 440 | Functional Classification |  | Rural Local |  | Railroad operator         |  |  |  | CSX               |  |  |
| 24 Hour Train vol  | 2   | Land Use                  |  | Industrial  |  | MP                        |  |  |  | 116.18            |  |  |
| Transit Route      | No  | Exist. Warning Device     |  | Crossbucks  |  | Crossing Sight Condition  |  |  |  | Poor              |  |  |
| School Bus Route   | No  | Preemption                |  | N/A         |  | Redundant Crossing        |  |  |  | No                |  |  |
| Truck Route        | No  | Crossing issue            |  | Sight dist  |  | Economic Impact if closed |  |  |  | Med               |  |  |
| Bike Route         | No  | Crossing Geometry         |  | Good        |  | Exposure Index            |  |  |  | 880               |  |  |
| Emer Serv Critical | N/A | Need for X-ing Surf Imp   |  | No          |  | Accident History          |  |  |  | N/A               |  |  |

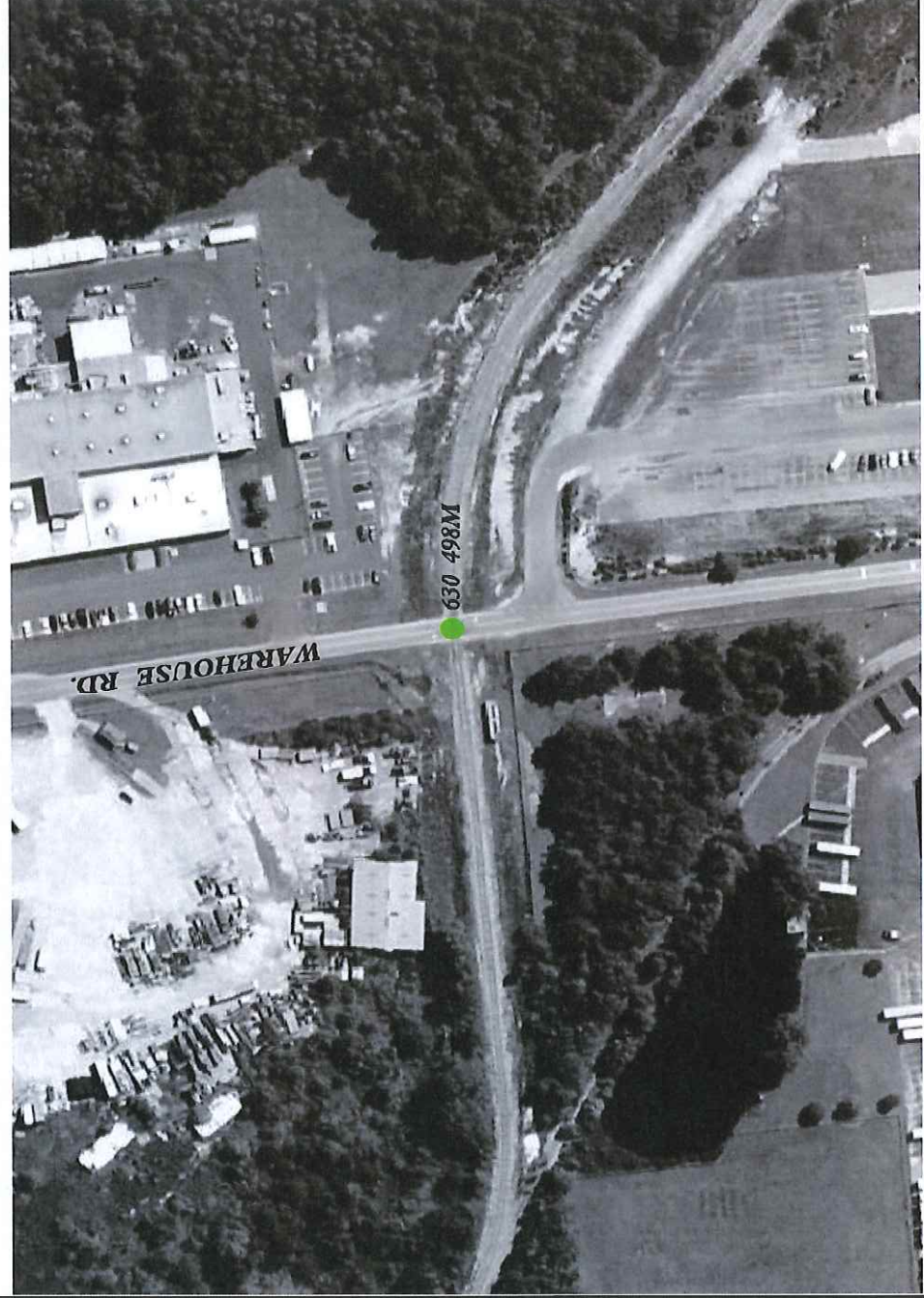


Figure B-20a

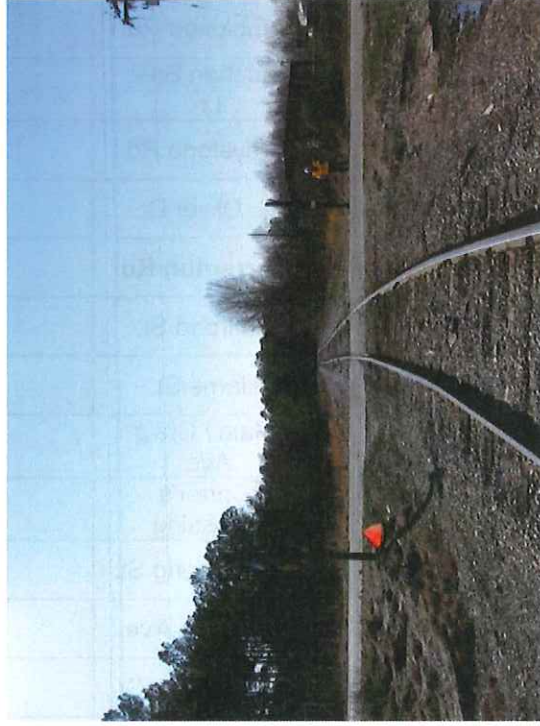
## Crossing# 630 498M (Warehouse Road)



Looking East



Looking North



Looking West



Looking South





## C. Crossing Analysis

### 1. Exposure Index

An exposure index is used by NCDOT to help determine if grade separation is needed at a rail crossing. The exposure index is calculated by multiplying the number of trains per day by the number of vehicles per day that use the crossing. If an at-grade crossing has an exposure index of 15,000 or more in a rural area, or 30,000 or more in an urban area, the possibility of converting that location to a grade separated crossing is investigated.

**Table C-1** lists the exposure index calculations for the 20 crossings studied. Three (3) crossings exceeded the exposure index of 30,000 (Warrenton Road, Andrews Avenue, and Chavasse Avenue).

**Table C-1: Exposure Index**

| Crossing Number | Street Name          | Trains Per Day | AADT          | Exposure Index |
|-----------------|----------------------|----------------|---------------|----------------|
| 630 418S        | Brookston Rd.        | 5              | 704           | 3,520          |
| 630 419Y        | Buchan Best Ln.      | 5              | N/A           | UNK            |
| 630 421A        | Greystone Rd.        | 5              | 520           | 2,600          |
| 630 423N        | N. Oliver Dr.        | UNK            | 98            | UNK            |
| <b>630 424V</b> | <b>Warrenton Rd.</b> | <b>5</b>       | <b>9,100</b>  | <b>45,500</b>  |
| 630 427R        | Railroad St.         | 5              | 250           | 1,250          |
| 630 428X        | Harris St.           | 5              | 2,498         | 12,490         |
| 630 429E        | Main / Craig Ave.    | 5              | 1,300         | 6,500          |
| 630 432M        | Carter's Crossing    | 5              | 1,144         | 5,720          |
| 630 433U        | Rock Spring St.      | 5              | 3,707         | 18,535         |
| <b>630 483X</b> | <b>Andrews Ave.</b>  | <b>5</b>       | <b>15,000</b> | <b>75,000</b>  |
| 630 485L        | Montgomery St.       | 5              | 2,954         | 14,770         |



| Crossing Number | Street Name          | Trains Per Day | AADT         | Exposure Index |
|-----------------|----------------------|----------------|--------------|----------------|
| 630 486T        | Winder St.           | 5              | 881          | 4,405          |
| 630 487A        | Orange St.           | 5              | 606          | 3,030          |
| 630 488 G       | Spring St.           | 5              | 1,100        | 5,500          |
| <b>630 489N</b> | <b>Chavasse Ave.</b> | <b>5</b>       | <b>7,400</b> | <b>37,000</b>  |
| 630 494K        | St. Matthews St.     | 5              | 4,687        | 23,435         |
| 630 495S        | Welcome Ave.         | 5              | 3,600        | 18,000         |
| 630 497F        | J.P. Taylor Rd.      | 5              | 3,700        | 18,500         |
| 630 498M        | Warehouse Rd.        | 2              | 440          | 880            |

## 2. Physical Characteristics

Other considerations in determining the necessity for grade improvements are:

- Accident history
- Topography
- Adjacent land use
- Construction impacts
- Costs

The study looked at these factors at each of the crossings to help determine the most effective recommendation.

## 3. Accident Analysis

Of the twenty (20) crossings in the study area, eleven (11) have at least one reported train/vehicle accident, with a total of thirty-one (31) accidents for all. Most of the reported accidents involved vehicles that either stalled on the crossing, or failed to stop for an on-coming train. There was also one (1)





pedestrian fatality in the study area. This occurred at the Montgomery Street crossing.

Accidents are classified as one of the following:

- Fatality
- Injury
- PDO – Property Damage Only

**Table C-2** lists accident data for the seven crossings.

**Table C-2: Accident Data**

| Crossing Number | Street Name       | Total Number of Accidents | Number with Fatalities | Number with Injuries | Number with PDO | Accident Types                               |
|-----------------|-------------------|---------------------------|------------------------|----------------------|-----------------|----------------------------------------------|
| 630 418S        | Brookston Rd.     | 3                         | 0                      | 0                    | 3               | Stalled on crossing, Stopped on crossing (2) |
| 630 419Y        | Buchan Best Ln    | N/A                       | N/A                    | N/A                  | N/A             | N/A                                          |
| 630 421A        | Greystone Rd.     | N/A                       | N/A                    | N/A                  | N/A             | N/A                                          |
| 630 423N        | N. Oliver Dr.     | N/A                       | N/A                    | N/A                  | N/A             | N/A                                          |
| 630 424V        | Warrenton Rd.     | N/A                       | N/A                    | N/A                  | N/A             | N/A                                          |
| 630 427R        | Railroad St.      | 4                         | 0                      | 2                    | 2               | Did not stop (2), Stopped on crossing (2)    |
| 630 428X        | Harris St.        | 1                         | 0                      | 0                    | 1               | Drove around or thru the gate                |
| 630 429E        | Main / Craig Ave. | N/A                       | N/A                    | N/A                  | N/A             | N/A                                          |
| 630 432M        | Carter's Crossing | N/A                       | N/A                    | N/A                  | N/A             | N/A                                          |
| 630 433U        | Rock Spring St.   | 5                         | 0                      | 2                    | 3               | Did not stop (3), Stopped on crossing (2)    |
| 630 483X        | Andrews Ave.      | 4                         | 0                      | 0                    | 4               | Stopped on crossing (4)                      |
| 630 485L        | Montgomery St.    | 1                         | 1                      | 0                    | 0               | Pedestrian-related                           |
| 630 486T        | Winder St.        | 2                         | 0                      | 0                    | 2               | Did not stop (2)                             |



| Crossing Number | Street Name      | Total Number of Accidents | Number with Fatalities | Number with Injuries | Number with PDO | Accident Types                            |
|-----------------|------------------|---------------------------|------------------------|----------------------|-----------------|-------------------------------------------|
| 630 487A        | Orange St.       | N/A                       | N/A                    | N/A                  | N/A             | N/A                                       |
| 630 488 G       | Spring St.       | 1                         | 0                      | 0                    | 1               | Did not stop                              |
| 630 489N        | Chavasse Ave.    | 1                         | 0                      | 0                    | 1               | Did not stop                              |
| 630 494K        | St. Matthews St. | N/A                       | N/A                    | N/A                  | N/A             | N/A                                       |
| 630 495S        | Welcome Ave.     | 4                         | 0                      | 0                    | 4               | Stopped on crossing (4)                   |
| 630 497F        | J.P. Taylor Rd.  | 6                         | 0                      | 4                    | 2               | Stopped on crossing (2), Did not stop (4) |
| 630 498M        | Warehouse Rd.    | N/A                       | N/A                    | N/A                  | N/A             | N/A                                       |

#### 4. Benefit/Cost Ratios

Benefit/cost ratios were determined using GradeDec, a software package developed to assist with grade crossing investment analyses. GradeDec utilizes vehicular volume data as well as train movement and speed data to assess the impact of rail corridor investments on safety, and highway delay and queuing. Benefits of the project are predicted based on improvements such as the following:

- Increased safety and reduced accident costs
- Reduction in travel time costs
- Improved air quality
- Reduced vehicle operating costs
- Network benefits





The benefit/cost ratio (b/c) is calculated by comparing the calculated benefit (in terms of dollars) to the cost of the improvements. Typically, an overall b/c of 1 or better is considered as desirable. Based on the recommended improvements in the Henderson Traffic Separation Study, the overall b/c is 0.42. While this does not meet the desired minimum, this study was envisioned to serve as more of an interim plan, as additional changes will likely follow through the Southeast High Speed Rail project. This study focused more on short-term and mid-range improvements that could serve the public in the interim. However, the plan was formulated such that if the Southeast High Speed Rail project does not move forward, the recommendations contained in this study will still be valid.

**Appendix D** shows the evaluation tables generated by the GradeDec program.

## D. Safety and Mobility Issues

The following section outlines several areas affecting rail crossings that can be analyzed and enhanced to improve rail crossing safety.

### 1. *Vehicles Queuing Across Railroad Tracks*

Traffic signals, intersections, and parallel roadways in close proximity to a rail crossing can cause vehicles to stop and begin queuing across the rail crossing. The following crossings in this study were noticed to have queuing problems during site inspections:

- Andrews Ave. (Crossing 630 483X)
- J.P. Taylor Rd. (Crossing 630 497F)



## 2. Traffic Signal Preemption

Traffic signals within 200 feet of a highway/rail at-grade crossing must be coordinated with the crossing's train detection and warning system in accordance with The Manual on Uniform Traffic Control Devices.

## 3. Humped Crossings

Humped crossings occur where the rail elevation is higher than that of the intersecting road, causing a vehicle to ascend on approach and descend upon exit. Depending on the severity of the hump "bottoming out" can occur, in some instances causing the vehicle to become stuck on the crossing. The following were noted as being "humped crossings":

- Railroad St. (Crossing 630 427R)
- Carter's Crossing (Crossing 630 432M)
- Andrews Ave. (Crossing 630 483X)
- Winder St. (Crossing 630 486T)
- Orange St. (Crossing 630 487A)
- Spring St. (Crossing 630 488G)
- Chavasse Ave. (Crossing 630 489N)

## 4. Grade Crossing Condition

Grade crossings often use materials such as asphalt, concrete slab, and rubber. Over time these materials will deteriorate causing the ride over them to become more uneven. As a result traffic flow over the crossing slows down and may add to congestion issues. Of the crossings studied, the following were noted as being in poor condition:

- Buchan Best Ln. (Crossing 630 419Y)
- Warrenton Rd. (Crossing 630 424V)
- Main / Craig Ave. (Crossing 630 429E)





- Carter's Crossing (Crossing 630 432M)
- Rock Spring St. (Crossing 630 433U)
- Andrews Ave. (Crossing 630 483X)
- Winder St. (Crossing 630 486T)
- Orange St. (Crossing 630 487A)
- Spring St. (Crossing 630 488G)
- Chavasse Ave. (Crossing 630 489N)

### *5. Vehicles Driving Around Automated Gates*

Gate failure, no visible evidence of a train, and impatience are contributing factors in motorists ignoring and driving around automated gates. One accident was the result of driving around the automated gates, occurring at the following crossing:

- Harris St. (Crossing 630 428X)

### *6. Improved Signs and Markings*

Wear and age reduce the effectiveness of warning devices, and visibility of signs, and markings. It was noted that the following crossings were in need of sign and/or marking maintenance:

- Harris St. (Crossing 630 428X)
- Main / Craig Ave. (Crossing 630 429E)
- Spring St. (Crossing 630 488G)
- Chavasse Ave. (Crossing 630 489N)
- J.P. Taylor Rd. (Crossing 630 497F)
- Warehouse Rd. (Crossing 630 498M)



## **E. System Enhancement Options**

### **1. Crossing Protection Device Upgrades**

Upgrading the existing warning devices at a crossing is the most widely used and cost effective strategy for increasing the crossing's safety. Factors such as speed, sight distance, and traffic volume go into determining whether only passive devices such as crossbucks and stop signs should be used, or active devices such as flashing signals and gates are needed. Standard upgrades ordered by level of protection from least to greatest are as follows:

1. Unmarked (least protective)
2. Crossbucks
3. Stop signs and crossbucks
4. Flashing light pairs and bells
5. Flashing light pairs, bells, and gates

### **Advanced Crossing Protection Devices**

Standard upgrades do not always ensure that a crossing is safe and advanced crossing protection devices are required. These upgrades are most often used at high-volume and multiple lane crossings where standard warning devices are ignored and bypassed altogether. Based on the nature of this study, no advanced crossing protection devices were recommended.

### **Crossing Consolidation & Elimination**

Due to low traffic volumes at crossings in an area where multiple crossings exist close by, it is often more cost effective to close a crossing and reroute traffic to a nearby crossing. The crossing handling the rerouted traffic can then be upgraded to a higher level of protection. With fewer crossings maintenance monitoring is increased with service issues and cost reduced. Closure candidates include:





- 630 488G Spring St.
- 630 487A Orange St.
- 630 486T Winder St.
- 630 433U Rock Spring St.
- 630 432M Carter's Crossing
- 630 427R Railroad St.

### Roadway Improvements

Improvements such as the following allow vehicle traffic to flow more freely over the crossing by increasing sight distance, removing "humps", and reducing queuing:

- Re-grading and removing the "hump" from the crossing at 630 429E (Main / Craig Ave.)
- Resurfacing the crossings at 630 489N (Chavasse Ave.), 630 483X (Andrews Ave.), and 630 424V (Warrenton Rd.)
- Removing parking possibly obscuring sight distance at 630 485L (Montgomery St.)
- Removing vegetation obscuring sight distance at 630 489K (St. Matthews St.)

Signal timing and preemption improvements can be utilized such that traffic flows more efficiently and does not queue over the crossing. Due to the nature of this study, no signal timing or preemption changes were evaluated.

## **F. Public Involvement**

Public Involvement for the Traffic Separation Study included the following:

- Stakeholder Meetings (6/30/2009 & 1/13/2010)
- Public Workshop (11/17/2009)



- Henderson City Council Presentation (7/27/2009)
- Public Hearing (4/12/2010)

### *1. Stakeholder Meeting # 1*

A stakeholder committee was formed with the understanding that their knowledge of the study area was critical in forming a consensus on rail crossing recommendations. The following agencies comprised the stakeholder committee:

- City of Henderson Manager
- City of Henderson Police
- City of Henderson Fire
- City of Henderson Planning Director
- City of Henderson Chamber of Commerce
- City of Henderson Downtown Development Corporation
- Vance County Public School
- NCDOT Division Engineers
- NCDOT District Engineers
- NCDOT Rail Division
- CSX

The first stakeholder meeting was held on June 30, 2009. The purpose of this meeting was to present the initial findings and recommendations to the committee. The committee requested surface improvements be made to the Chavasse crossing, noting that there is a NCDOT project at this crossing, but is currently on hold. The project was originally put on hold to await the completion of the traffic separation. Since that time, funding shortfalls have negatively affected the possibility of NCDOT completing the project in the near term. Bear Pond Road was also requested to be added to the study, but was determined to be outside the city limits.





## 2. *Public Workshop*

A public workshop for the project was held in the City of Henderson on November 17, 2009 at the City Council Chamber. The objective of the public meeting was to present the recommendations and their potential impact on traffic flow for each of the 20 crossings and to receive public comment on the recommendations.

## 3. *Stakeholder Meeting # 2*

The second meeting of the Stakeholder Committee was on January 13, 2010. The purpose of this meeting was to discuss the public comments regarding the recommendations and to reach a final consensus on recommendations for the implementation phase.

The committee requested that the Harris Street and St. Matthews Street crossings remain open due to impact on Fire Department and Police Department response times. However, the plan will recommend improvements to sight distance through possible clearing of vegetation for the St. Matthews Street crossing. It was also requested that the possibility of revising signal timings at Andrews Avenue be investigated such that left-turns onto NC 39 would still be permitted.

## 4. *Newsletters*

A newsletter elaborating on the project background in addition to the study process and schedule was distributed at the public workshop. A copy of this newsletter can be found in **Appendix B**.



## 5. Henderson City Council Presentation

A presentation was made to the Henderson City Council on July 27, 2009 regarding the progress of the study and recommendations generated from the study. No major concerns or issues were raised by the City Council.

## 6. Public Hearing

The City of Henderson held a public hearing for the project during their April 12, 2010 City Council meeting. The hearing was advertised following the adopted public involvement policy of the City. During the hearing, two citizens spoke in opposition to the project, citing the potential of the proposed closures to divide the community, and to inconvenience downtown merchants who use the crossings to bring products to their stores. After discussing the issues, the Council voted 5-3 to approve the plan as presented.

# G. Recommendations

## 1. Crossing Recommendations

This section covers each crossing individually highlighting relevant data and findings. Aerials of each crossing are provided in **Figures G-1** through **G-21** with the recommended action and crossing number listed on each. A summarization with associated costs is provided in **Table G-1**. See **Table G-2** for a listing of Figures.

The primary goal of these improvements is to increase highway/rail safety within the study area through enhancement of existing safety features and reduction in the number of existing crossings.





Recommendations for this study are classified as follows:

- Near-term (0-2 years)
- Mid-term (2-5 years)
- No Action

## **2. Near-term Recommendations**

### Crossing Surface Improvements:

- Warrenton Rd. (Crossing 630 424V)

### Roadway Improvements – Remove Parking Along Street:

- Montgomery St. (Crossing 630 485L)

### Sight Distance Improvements – Vegetation Removal:

- St. Matthews St. (Crossing 630 494K)

### Closure:

- Carter's Crossing (Crossing 630 432M)
- Winder St. (Crossing 630 486T)
- Spring St. (Crossing 630 488G)

## **3. Mid-term Recommendations**

### Add Gates:

- Warehouse Rd. (Crossing 630 498M)

### Crossing Grade Improvements – Remove Hump:

- Main / Craig Ave. (Crossing 630 429E)



Crossing Surface Improvements:

- Andrews Ave. (Crossing 630 483X)
- Chavasse Ave. (Crossing 630 489N)

Closure:

- Railroad St. (Crossing 630 427R)
- Rock Spring St. (Crossing 630 433U)
- Orange St. (Crossing 630 487A)

**4. No Action Recommended**

- Brookston Rd. (Crossing 630 418S)
- Buchan Best Ln. (Crossing 630 419Y)
- Greystone Rd. (Crossing 630 421A)
- N. Oliver Dr. (Crossing 630 423N)
- Harris St. (Crossing 630 428X)
- Welcome Ave. (Crossing 630 495S)
- J.P. Taylor Rd. (Crossing 630 497F)



**Table G1 - Summary of Recommendations and Costs**

| Crossing Reference Number | Crossing Number | Street Name       | Recommendation                                                                      | Est. Cost |
|---------------------------|-----------------|-------------------|-------------------------------------------------------------------------------------|-----------|
| G-1                       | 630 418S        | Brookston Rd.     | No Action                                                                           | None      |
| G-2                       | 630 419Y        | Buchan Best Ln.   | No Action                                                                           | None      |
| G-3                       | 630 421A        | Greystone Rd.     | No Action                                                                           | None      |
| G-4                       | 630 423N        | N. Oliver Dr.     | No Action                                                                           | None      |
| G-5                       | 630 424V        | Warrenton Rd.     | Improve Crossing Surface - Milling & Resurfacing                                    | \$6,400   |
| G-6                       | 630 427R        | Railroad St.      | Closure                                                                             | \$20,000  |
| G-7                       | 630 428X        | Harris St.        | No Action                                                                           | None      |
| G-8                       | 630 429E        | Main / Craig Ave. | Removal of Hump                                                                     | \$740,000 |
| G-9                       | 630 432M        | Carter's Crossing | Closure                                                                             | \$20,000  |
| G-10                      | 630 433U        | Rock Spring St.   | Closure                                                                             | \$20,000  |
| G-11                      | 630 483X        | Andrews Ave.      | Improve Crossing Surface, Investigate Signal Timing Changes at NC39 and Garnett St. | \$30,500  |
| G-12                      | 630 485L        | Montgomery St.    | Remove Parking Along Street                                                         | \$500     |
| G-13                      | 630 486T        | Winder St.        | Closure                                                                             | \$20,000  |
| G-14                      | 630 487A        | Orange St.        | Closure                                                                             | \$20,000  |
| G-15                      | 630 488G        | Spring St.        | Closure                                                                             | \$20,000  |
| G-16                      | 630 489N        | Chavasse Ave.     | Improve Crossing Surface                                                            | \$16,000  |
| G-17                      | 630 494K        | St. Matthews St.  | Remove Vegetation in Sight Dist.                                                    | \$15,000  |
| G-18                      | 630 495S        | Welcome Ave.      | No Action                                                                           | None      |
| G-19                      | 630 497F        | J.P. Taylor Rd.   | No Action                                                                           | None      |
| G-20                      | 630 498M        | Warehouse Rd.     | Add Gates                                                                           | \$200,000 |

**Table G2 - INDEX FOR GRADE CROSSING FIGURES**

| Crossing Reference Number | Crossing Number | Street Name       | Existing Conditions Figure # | Crossing Photos | Recommendations Figure # |
|---------------------------|-----------------|-------------------|------------------------------|-----------------|--------------------------|
| 1                         | 630 418S        | Brookston Rd.     | B-1a                         | B-1b            | G-1                      |
| 2                         | 630 419Y        | Buchan Best Ln.   | B-2a                         | B-2b            | G-2                      |
| 3                         | 630 421A        | Greystone Rd.     | B-3a                         | B-3b            | G-3                      |
| 4                         | 630 423N        | N. Oliver Dr.     | B-4a                         | B-4b            | G-4                      |
| 5                         | 630 424V        | Warrenton Rd.     | B-5a                         | B-5b            | G-5                      |
| 6                         | 630 427R        | Railroad St.      | B-6a                         | B-6b            | G-6                      |
| 7                         | 630 428X        | Harris St.        | B-7a                         | B-7b            | G-7                      |
| 8                         | 630 429E        | Main / Craig Ave. | B-8a                         | B-8b            | G-8                      |
| 9                         | 630 432M        | Carter's Crossing | B-9a                         | B-9b            | G-9                      |
| 10                        | 630 433U        | Rock Spring St.   | B-10a                        | B-10b           | G-10                     |
| 11                        | 630 483X        | Andrews Ave.      | B-11a                        | B-11b           | G-11                     |
| 12                        | 630 485L        | Montgomery St.    | B-12a                        | B-12b           | G-12                     |
| 13                        | 630 486T        | Winder St.        | B-13a                        | B-13b           | G-13                     |
| 14                        | 630 487A        | Orange St.        | B-14a                        | B-14b           | G-14                     |
| 15                        | 630 488G        | Spring St.        | B-15a                        | B-15b           | G-15                     |
| 16                        | 630 489N        | Chavasse Ave.     | B-16a                        | B-16b           | G-16                     |
| 17                        | 630 494K        | St. Matthews St.  | B-17a                        | B-17b           | G-17                     |
| 18                        | 630 495S        | Welcome Ave.      | B-18a                        | B-18b           | G-18                     |
| 19                        | 630 497F        | J.P. Taylor Rd.   | B-19a                        | B-19b           | G-19                     |
| 20                        | 630 498M        | Warehouse Rd.     | B-20a                        | B-20b           | G-20                     |

Figures included in this section



### **Brookston Road (Crossing # 630 418S)**

Brookston Road is a two-lane road that is located in a rural area of Henderson. The 2005 AADT was 704 vehicles. Warning devices consist of gates with crossbucks, bells, and flashing light pairs. Three accidents have been reported resulting in no injuries or fatalities.

Recommendation: No Action

**No Improvements  
Recommended at  
This Crossing**

**Figure G1**



Crossing #: 630 418S

Railroad: CSX

Henderson, NC

Not to Scale



**Buchan Best Lane (Crossing # 630 419Y)**

Buchan Best Lane is a gravel road that is located in a rural, residential area of Henderson. Warning devices consist of crossbucks and stop signs. No traffic or accident data was available for this crossing.

**Recommendation: No Action**

**No Improvements  
Recommended at  
This Crossing**

**Figure G2**



Crossing #: 630 419Y  
Railroad: CSX  
Henderson, NC

Not to Scale



### Greystone Road (Crossing # 630 421A)

Greystone Road is a two-lane road that is located in a rural, industrial area of Henderson. The 2008 AADT volume was 520 vehicles. Warning devices consist of cantilevers with crossbucks, gates, flashing light pairs, and bells. No accident data was available for this crossing.

**Recommendation:** No Action

**No Improvements  
Recommended at  
This Crossing**

630 421A

GREYSTONE RD.

**Figure G3**



**RAIL DIVISION**

**GIBSON**  
ENGINEERS, PC

Crossing #: 630 421A  
Railroad: CSX  
Henderson, NC

Not to Scale

**N. Oliver Drive (Crossing # 630 423N)**

N. Oliver Drive is a private drive that is located in a rural, residential area of Henderson. The 2005 AADT volume was 98 vehicles. Warning devices consist of crossbucks and stop signs. No accident data was available for this crossing.

**Recommendation: No Action**

630 423N

**No Improvements  
Recommended at  
This Crossing**

**Figure G4**



**RAIL DIVISION**

**GIBSON  
ENGINEERS, PC**

Crossing #: 630 423N  
Railroad: CSX  
Henderson, NC

Not to Scale



### Warrenton Road (Crossing # 630 424V)

Warrenton Road is a two-lane road that is located in an commercial area of Henderson. The 2006 AADT volume was 9100 vehicles. Warning devices consist of cantilevers with crossbucks, gates, flashing light pairs, and bells. No accident data was available for this crossing.

**Recommendation:** Improve Crossing Surface  
(Milling and Resurfacing)

WARRENTON RD. ←→

630 424V

Improve Crossing Surface

JOHN DEERE RD. ←→

US 1 RAMP ←→

Figure G5



RAIL DIVISION



Crossing #: 630 424V  
Railroad: CSX  
Henderson, NC

Not to Scale



### **Railroad Street (Crossing # 630 427R)**

Railroad Street is a two-lane road that is located in a residential area of Henderson. The 2006 AADT volume was 250 vehicles. Warning devices consist of crossbucks. 4 accidents have been reported resulting in 2 injuries and no fatalities.

**Recommendation:** Closure

Close Crossing

630 427R

Figure G6



RAIL DIVISION

GIBSON  
ENGINEERS, PC

Crossing #: 630 427R  
Railroad: CSX  
Henderson, NC

Not to Scale



### Harris Street (Crossing # 630 428X)

Harris Street is a two-lane road that is located in an industrial area of Henderson. The 2006 AADT volume was 2498 vehicles. Warning devices consist of gates with crossbucks, flashing light pairs, mast mounted lights, and bells. 1 accident was reported resulting in no injuries or fatalities.

Recommendation: No Action

No Improvements  
Recommended at  
This Crossing

Figure G7



RAIL DIVISION

GIBSON  
ENGINEERS, PC

Crossing #: 630 428X  
Railroad: CSX  
Henderson, NC

Not to Scale



**Main /Craig Avenue (Crossing # 630 429E)**

Main /Craig Avenue is a two-lane road that is located in an industrial area of Henderson. The 2006 AADT volume was 1300 vehicles. Warning devices consist of cantilevers with crossbucks, gates, flashing light pairs, and bells. No accident data was available for this crossing.

**Recommendation: Remove Hump**

**Remove Hump**

**Figure G8**



**RAIL DIVISION**

**GIBSON**  
ENGINEERS, PC

Crossing #: 630 429E  
Railroad: CSX  
Henderson, NC

Not to Scale



**Carter's Crossing (Crossing # 630 432M)**

Carter's Crossing is a two-lane road that is located in a residential area of Henderson. The 2006 AADT volume was 1144 vehicles. Warning devices consist of mast mounted flashing light pairs with crossbucks. No accident data was available for this crossing.

**Recommendation: Closure**



**Figure G9**



Crossing #: 630 432M  
Railroad: CSX  
Henderson, NC

Not to Scale



**Rock Spring Street (Crossing # 630 433U)**

Rock Spring Street is a two-lane road that is located in a commercial area of Henderson. The 2008 AADT volume was 3707 vehicles. Warning devices consist of gates with crossbucks, flashing light pairs, and bells. 5 accidents have been reported resulting in 4 injuries and no fatalities.

**Recommendation:** Closure

Close Crossing

630 433U

E. ROCK SPRING ST.

W. ROCK SPRING ST.

N. GARNETT ST.

N. WILLIAMS ST.

HAMILTON ST.

Figure G10



Crossing #: 630 433U  
Railroad: CSX  
Henderson, NC

Not to Scale



### Andrews Avenue (Crossing # 630 483X)

Andrews Avenue is a three-lane road that is located in a commercial area of Henderson. The 2008 AADT volume was 15000 vehicles. Warning devices consist of a cantilever and gates with crossbucks, flashing light pairs, and bells. 4 accidents have been reported resulting in no injuries or fatalities.

**Recommendation:** Improve Crossing Surface,  
Investigate Signal Timing  
Changes at NC 39 and Garnett St.

Improve Crossing Surface,  
Investigate Signal Timing Changes

630 483X

Figure GII



RAIL DIVISION

GIBSON  
ENGINEERS, PC

Crossing #: 630 483X  
Railroad: CSX  
Henderson, NC

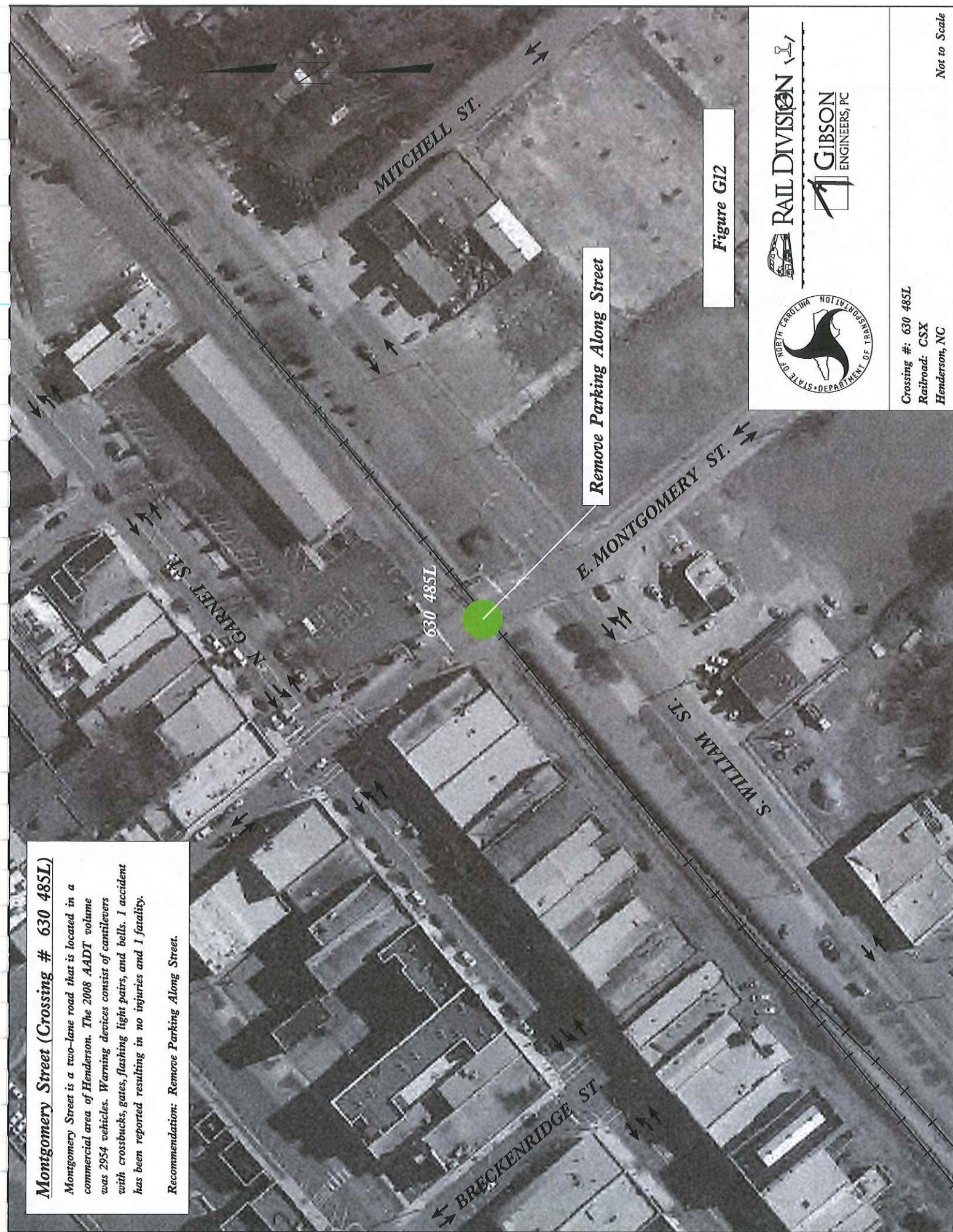
Not to Scale



**Montgomery Street (Crossing # 630 485L)**

Montgomery Street is a two-lane road that is located in a commercial area of Henderson. The 2008 AADT volume was 2954 vehicles. Warning devices consist of cantilevers with crossbucks, gates, flashing light pairs, and bells. 1 accident has been reported resulting in no injuries and 1 fatality.

**Recommendation: Remove Parking Along Street.**



**Figure G12**



Crossing #: 630 485L  
Railroad: CSX  
Henderson, NC

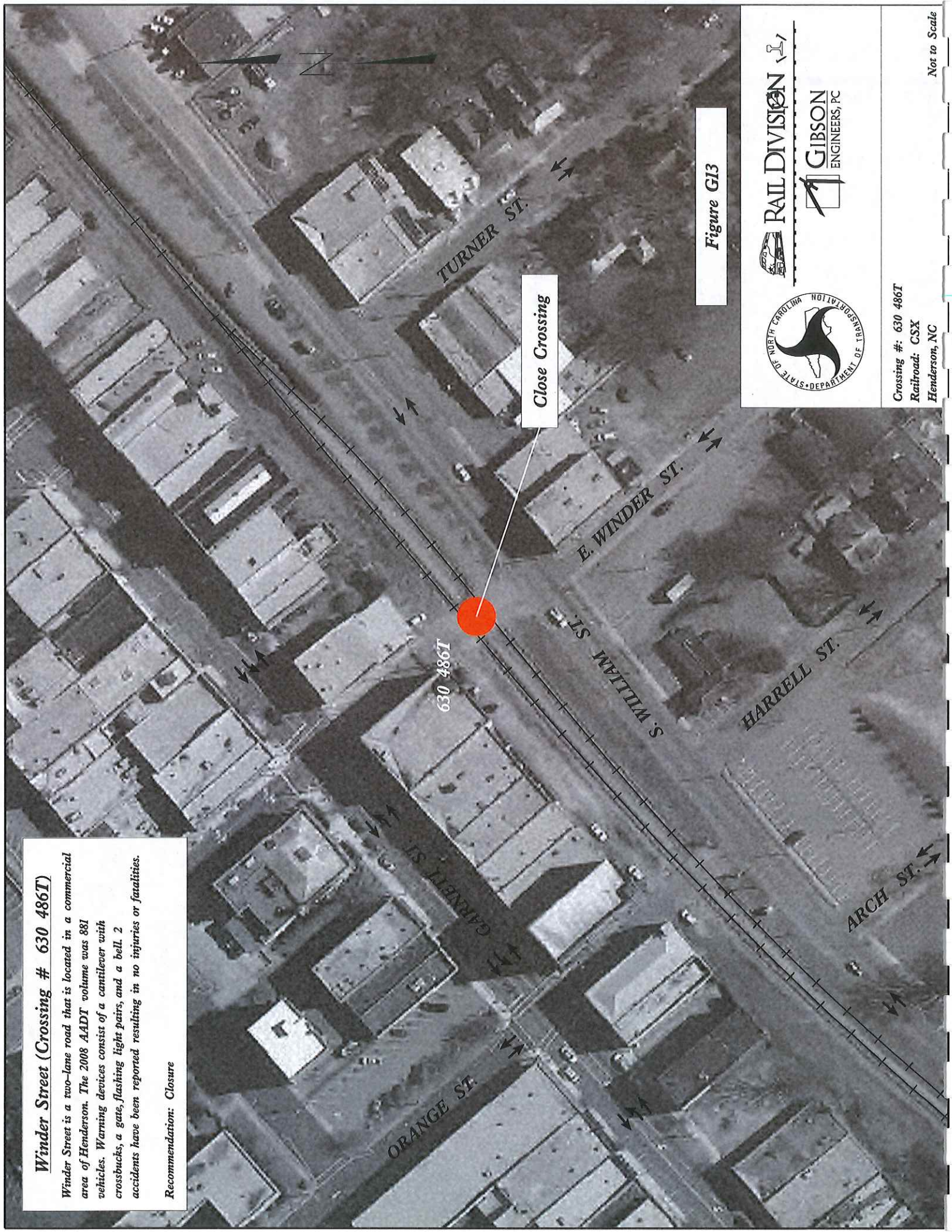
Not to Scale



**Winder Street (Crossing # 630 486T)**

Winder Street is a two-lane road that is located in a commercial area of Henderson. The 2008 AADT volume was 881 vehicles. Warning devices consist of a cantilever with crossbucks, a gate, flashing light pairs, and a bell. 2 accidents have been reported resulting in no injuries or fatalities.

**Recommendation:** Closure



**Figure G13**



Crossing #: 630 486T  
Railroad: CSX  
Henderson, NC

Not to Scale



**Orange Street (Crossing # 630 487A)**

Orange Street is a two-lane road that is located in a commercial area of Henderson. The 2008 AADT volume was 606 vehicles. Warning devices consist of gates with crossbucks, flashing light pairs, and a bell. No accident data was available for this crossing.

Recommendation: Closure

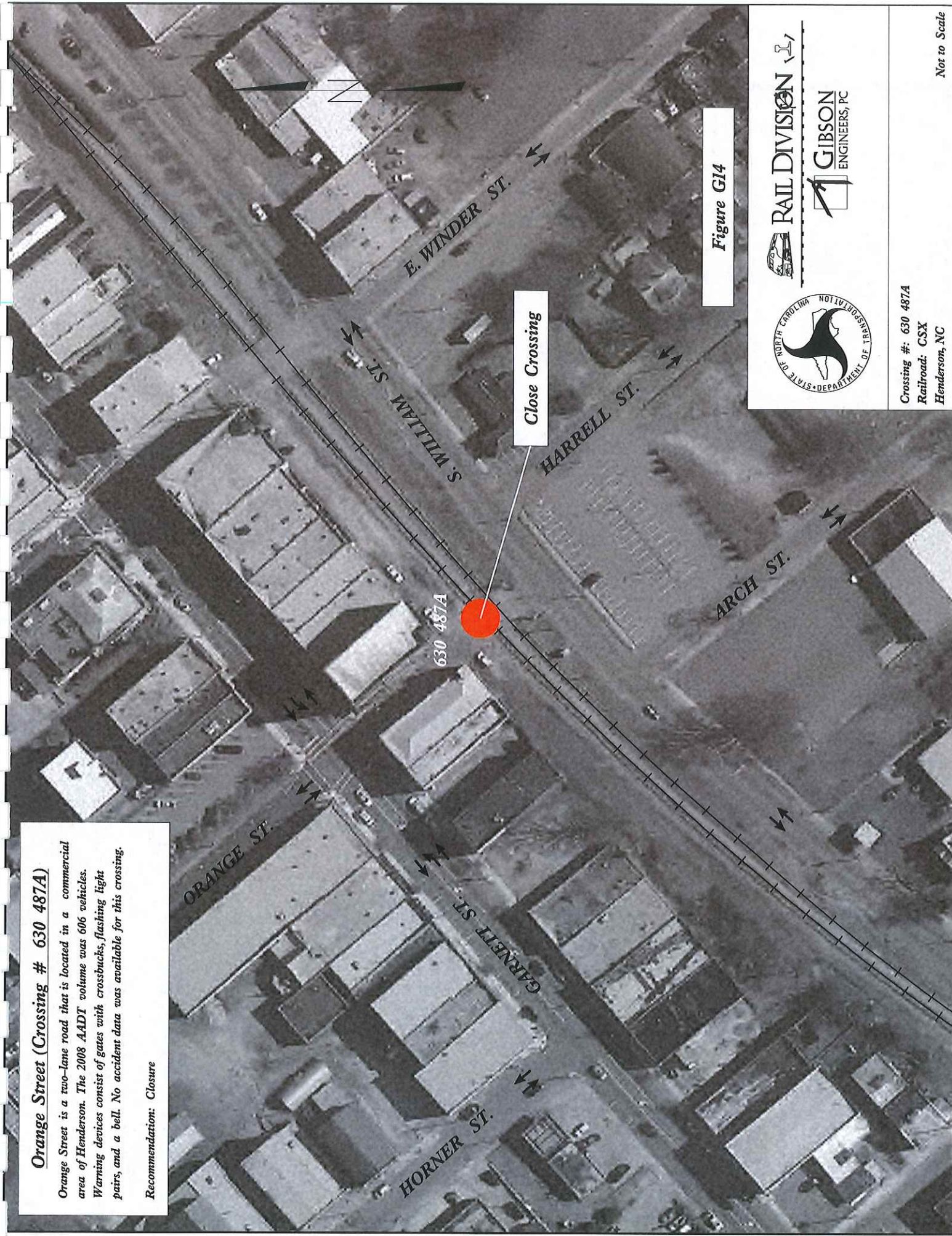


Figure G14



RAIL DIVISION



Crossing #: 630 487A  
Railroad: CSX  
Henderson, NC

Not to Scale



### Spring Street (Crossing # 630 488G)

Spring Street is a two-lane road that is located in a commercial area of Henderson. The 2006 AADT was 1100 vehicles. Warning devices consist of cantilevers with crossbucks, gates, bells, and flashing light pairs. One accident was reported resulting in no injuries or fatalities.

**Recommendation:** Closure

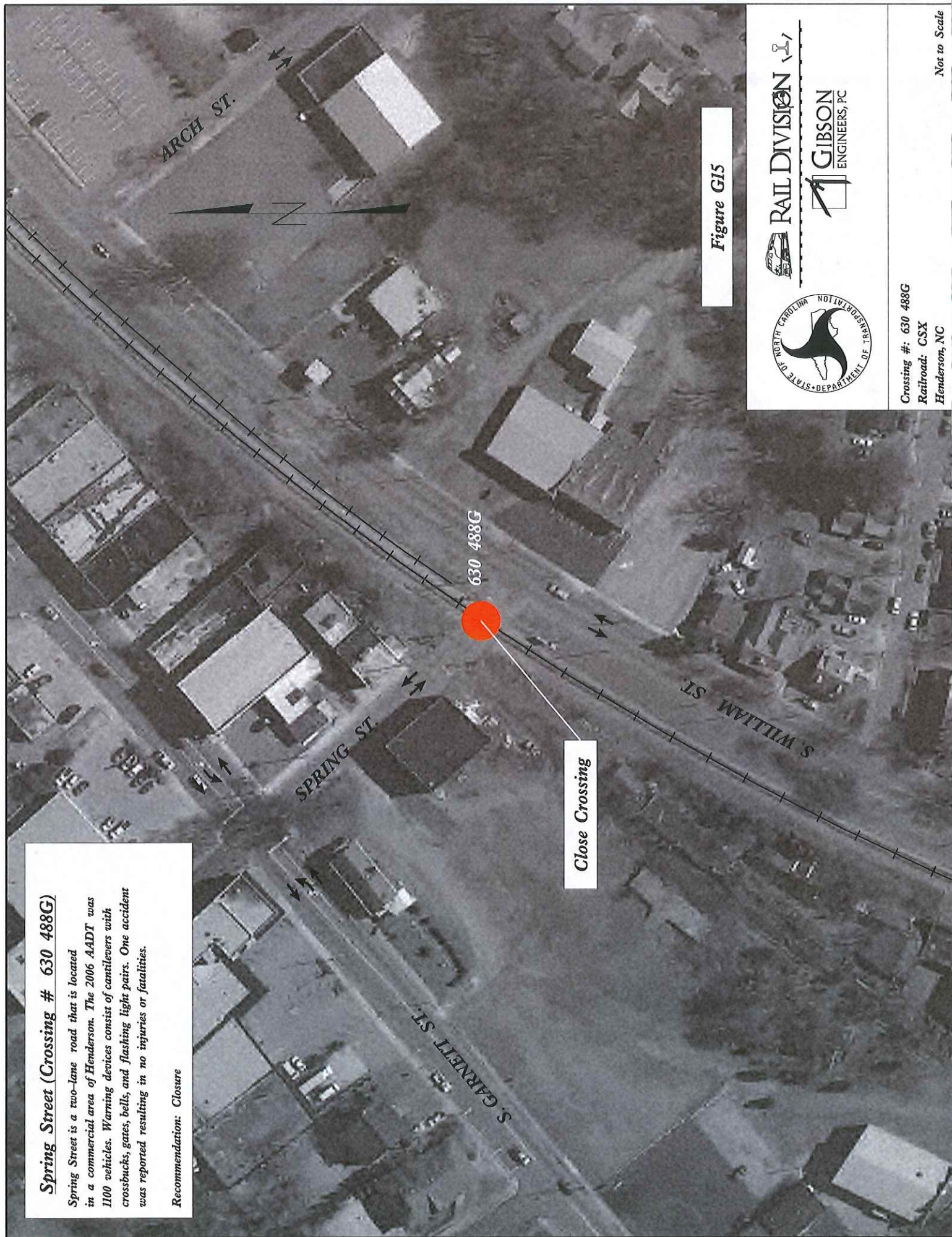


Figure GL5



RAIL DIVISION

GIBSON  
ENGINEERS, PC

Crossing #: 630 488G  
Railroad: CSX  
Henderson, NC

Not to Scale



**Chavasse Avenue (Crossing # 630 489N)**

Chavasse Avenue is a two-lane road that is located in a commercial area of Henderson. The 2006 AADT was 7400 vehicles. Warning devices consist of gates with crossbucks, bells, and flashing light pairs. One accident has been reported resulting in no injuries or fatalities.

**Recommendation: Improve Crossing Surface**



**Figure G16**



Crossing #: 630 489N  
Railroad: CSX  
Henderson, NC

Not to Scale



**St. Matthews Street (Crossing # 630 494K)**

St. Matthews Street is a two-lane road that is located in an industrial area of Henderson. The 2006 AADT was 4687 vehicles. Warning devices consist of cantilevers with crossbucks, gates, bells, and flashing light pairs. No accident data was available for this crossing.

**Recommendation: Removal of Vegetation In Sight Distance**

**Removal of Vegetation  
In Sight Distance**

**Figure G17**



**RAIL DIVISION**

**GIBSON**  
ENGINEERS, PC

Crossing #: 630 494K

Railroad: CSX

Henderson, NC

Not to Scale



### Welcome Avenue (Crossing # 630 495S)

Welcome Avenue is a two-lane road that is located in a residential area of Henderson. The 2006 AADT was 3600 vehicles. Warning devices consist of gates with crossbucks, bells, and flashing light pairs. Four accidents have been reported resulting in no injuries or fatalities.

**Recommendation: No Action**

**No Improvements  
Recommended at  
This Crossing**

**Figure G18**



**RAIL DIVISION**

**GIBSON**  
ENGINEERS, PC

Crossing #: 630 495S  
Railroad: CSX  
Henderson, NC

Not to Scale



**J.P. Taylor Road (Crossing # 630 497F)**

J.P. Taylor Road is a two-lane road that is located in an industrial area of Henderson. The 2008 AADT was 3700 vehicles. Warning devices consist of gates with crossbucks, bells, and flashing light pairs. Six accidents have been reported resulting in four injuries and no fatalities.

**Recommendation: No Action**

**No Improvements  
Recommended at  
This Crossing**

630 497F

J.P. TAYLOR RD.

RALEIGH RD.

**Figure G19**



Crossing #: 630 497F

Railroad: CSX

Henderson, NC

Not to Scale



**Warehouse Road (Crossing # 630 498M)**

Warehouse Road is a two-lane road that is located in an industrial area of Henderson. The 2008 AADT was 440 vehicles. Warning devices consist of crossbucks. No accident data was available for this crossing.

Recommendation: Add Gates

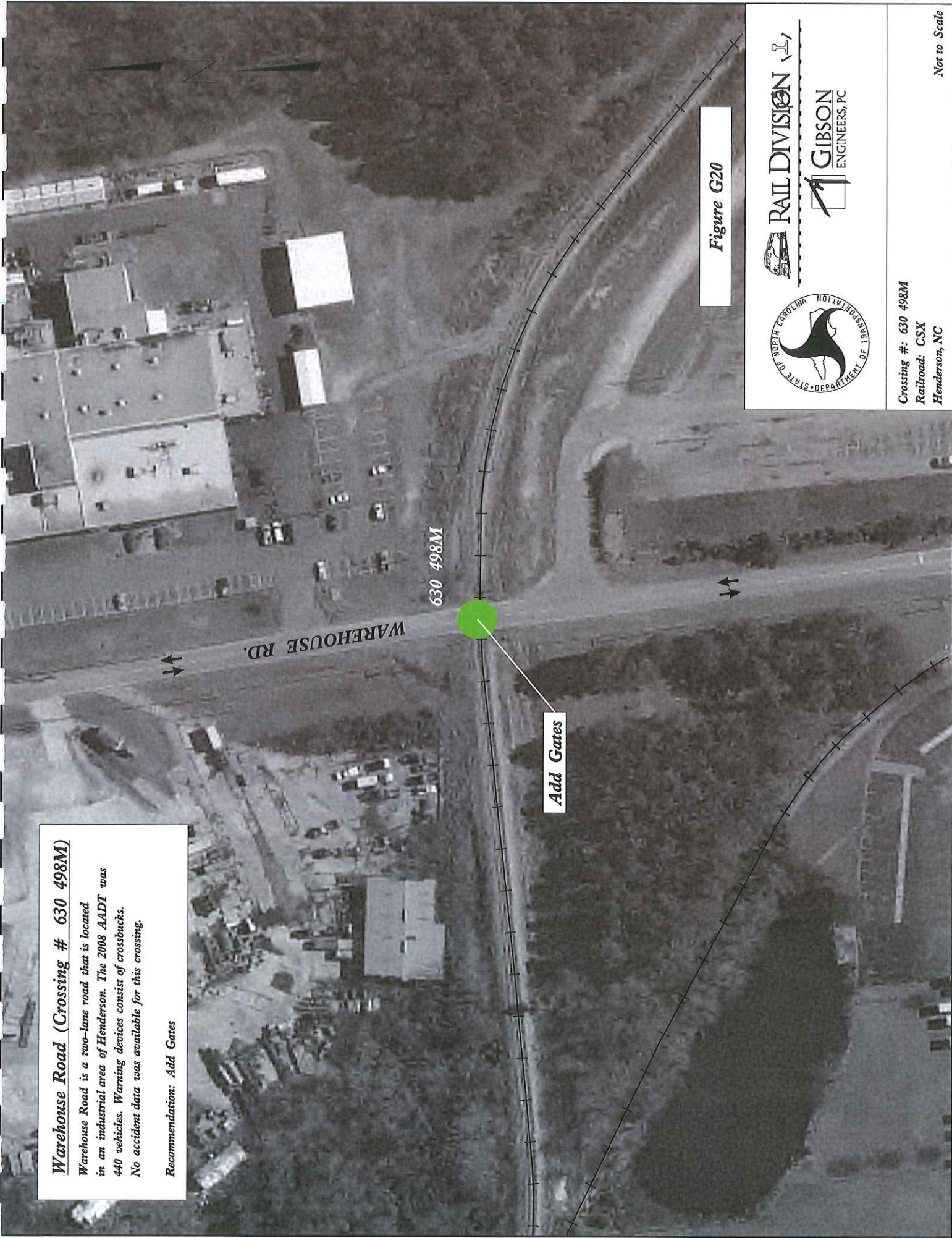


Figure G20



RAIL DIVISION

GIBSON  
ENGINEERS, PC

Crossing #: 630 498M  
Railroad: CSX  
Henderson, NC

Not to Scale



1. Introduction

2. Background

3. Methodology

4. Results

5. Discussion

6. Conclusion

7. References

8. Appendix

9. Glossary

10. Index

11. Acknowledgments

12. Author Biographies

13. Contact Information

14. Declaration of Interest

15. Funding Sources

16. Data Availability

17. Ethics Approval

18. Supplementary Materials

19. Correspondence

20. Notes



## **Appendix A**

### **Stakeholder Meeting Minutes**





Date: January 19, 2010

To: Attendees

From: Mark Freeman, PE, AICP  
Gibson Engineers

**Subject: Henderson Traffic Separation Study – Stakeholders Follow-up Meeting**

A meeting was held at the Henderson Town Hall on Wednesday January 13 2010 to update the stakeholders regarding the public workshop and to discuss revisions to the initial recommendations. In attendance were the following:

Danny Wilkerson – City of Henderson Fire Department  
Erris Dunston – City of Henderson  
Perry Twisdale – Henderson Police Department  
Phil Lakernick – City of Henderson, Downtown Development Coordinator  
Ronald Gregory – Vance County Schools  
Wally Bowman – NCDOT  
Stephen Winstead – NCDOT  
Nancy Horne – NCDOT  
Nathan Phillips – Gibson Engineers  
Mark Freeman – Gibson Engineers

Mark Freeman opened the meeting by providing a brief summary of concerns voiced at the November 17, 2009 project Public Workshop. Mr. Freeman explained that the majority of issues were in connection with the Harris Street crossing and the St. Matthews Street crossing. Also, there was one comment sent in after the workshop raising access concerns created by the closure of Orange and Winder Streets.

Nancy Horne added that while certain crossings may not closed as part of the Traffic Separation Study, the Southeast High Speed Rail project is currently recommending that all at grade crossings be closed.

Mr. Freeman and Ms. Horne added that this study was independent of the Southeast High Speed Rail project.

Danny Wilkerson stated that the closure of the Harris Street crossing could impact travel times for the Vance County Fire Department. The group agreed that this closure could be removed from the plan.



Also, Mr. Freeman noted the poor crossing at Main Street, and noted the severe hump at this location. The group agreed that the plan should recommend investigating the possibility of changing the grade on Main Street to improve the crossing. Mr. Freeman noted that improvements might not be feasible due to the approach to Old Norlina Road, and the fact that raising Main Street at the crossing would make the approach to Old Norlina even steeper. Additionally, Mr. Freeman explained that there was a long-range plan to extend Main Street to the east to connect with a proposed extension of John Deere Road. Thus, in accordance with the Long Range Transportation Plan, the crossing should remain open. Further, the current recommendation from the Southeast High Speed Rail plan is to realign Main Street to connect into Beckford Avenue. The Southeast High Speed Rail project would likely provide a grade separation at Main Street, and improve the crossing in that manner. Therefore, major construction will not be recommended as part of the Henderson TSS.

Mr. Wilkerson added that the closure of the St. Matthews Street crossing could impact Fire Department response times. Perry Twisdale added that the closure would also impact police response times to the residential areas east of US 1. The group agreed to recommend this closure be removed from the plan. However, the plan will recommend improvements to sight distance through possible clearing of vegetation.

Wally Bowman suggested that consideration be given to reassigning response zones to address the potential closures. Mr. Bowman added that while this would help to address these closures, that the reassignments will be further needed to address changes brought about by the Southeast High Speed Rail project.

Mr. Freeman mentioned that there was one comment provided regarding the Orange Street and Winder Street closures. Phil Lakernick mentioned that there was a downtown business with a store on one side of the track, and a warehouse on the opposite side and the owner was concerned with how vehicles would travel between the two. Mr. Freeman noted that while direct access would be removed, access could still be provided through the Montgomery Street crossing. The group also noted that the closures could affect the ability of trucks to enter these streets for loading and unloading. However, there is still an area adjacent to the tracks that could be used for a truck turn-around. Mr. Wilkerson and Mr. Gregory indicated the Fire Department and school busses avoided these crossings now due to geometric constraints.

The result of the conversation regarding Orange Street and Winder Street was that the recommendation to close the crossings would remain.

The group also discussed potential improvements at NC 39 (Andrews Avenue). Mr. Freeman stated that he did not see a minor improvement that would address the existing capacity issues at the intersection. Further, the current recommendation from the Southeast High Speed Rail plan was to grade separate this intersection. Mr. Freeman noted that while the restriction of movements (such as changing Williams Street to a right-in/right-out intersection) would help traffic flow on Andrews Avenue, it would impede traffic from the school. Thus, Gibson will investigate the possibility of revising signal timings at this location, but not make lane-related or access-related recommendations.

Mr. Gregory indicated that the school system wanted to ensure that vehicles would still be able to make left-turns from NC 39, and Mr. Freeman assured him that based on the proposed plan, this would be the case.

Ms. Horne asked if there were other improvements that were needed, such as crossing surface improvements. The following is a list of crossings for which additional crossing surface improvements were requested:

- Chavasse Avenue (crossing surface and approach improvements)
- Andrews Avenue (crossing surface improvements, )
- Warrenton Road (Crossing Surface improvements)

Mr. Bowman requested Stakeholders also let the team know if there are any design constraints that require addressing due to the proposed closures, such as insufficient turning radii at intersections.

A revised list of crossings and the proposed action by the team to be taken at each is attached.

If there are any questions or concerns with the data provided in this meeting summary, please provide those to Mark Freeman within five business days.



| Variable                    | Mean | SD   | Min | Max  | Skewness | Kurtosis | Normality |
|-----------------------------|------|------|-----|------|----------|----------|-----------|
| Age                         | 34.5 | 12.5 | 18  | 65   | 0.1      | 3.2      | 0.95      |
| Gender                      | 1.2  | 0.4  | 1   | 2    | 0.0      | 3.0      | 0.98      |
| Education                   | 12.5 | 2.5  | 9   | 16   | 0.2      | 3.5      | 0.92      |
| Income                      | 1500 | 500  | 500 | 3000 | 0.3      | 3.8      | 0.88      |
| Marital Status              | 1.5  | 0.5  | 1   | 2    | 0.0      | 3.0      | 0.98      |
| Occupation                  | 2.5  | 1.5  | 1   | 5    | 0.1      | 3.2      | 0.95      |
| Health Status               | 1.8  | 0.8  | 1   | 3    | 0.2      | 3.5      | 0.92      |
| Stress Level                | 2.2  | 1.2  | 1   | 4    | 0.1      | 3.2      | 0.95      |
| Life Satisfaction           | 3.5  | 1.5  | 1   | 5    | 0.2      | 3.5      | 0.92      |
| Resilience                  | 2.8  | 1.0  | 1   | 4    | 0.1      | 3.2      | 0.95      |
| Emotional Stability         | 3.2  | 1.2  | 1   | 5    | 0.2      | 3.5      | 0.92      |
| Psychological Well-being    | 3.8  | 1.5  | 1   | 5    | 0.1      | 3.2      | 0.95      |
| Social Support              | 2.5  | 1.0  | 1   | 4    | 0.2      | 3.5      | 0.92      |
| Life Events                 | 1.5  | 0.5  | 1   | 2    | 0.0      | 3.0      | 0.98      |
| Personal Growth             | 3.0  | 1.2  | 1   | 4    | 0.1      | 3.2      | 0.95      |
| Meaning in Life             | 3.5  | 1.5  | 1   | 5    | 0.2      | 3.5      | 0.92      |
| Existential Well-being      | 3.2  | 1.2  | 1   | 5    | 0.1      | 3.2      | 0.95      |
| Life Purpose                | 3.0  | 1.0  | 1   | 4    | 0.2      | 3.5      | 0.92      |
| Personal Fulfillment        | 3.8  | 1.5  | 1   | 5    | 0.1      | 3.2      | 0.95      |
| Life Satisfaction (Revised) | 3.5  | 1.5  | 1   | 5    | 0.2      | 3.5      | 0.92      |
| Overall Well-being          | 3.2  | 1.2  | 1   | 5    | 0.1      | 3.2      | 0.95      |



## **Appendix B**

### **Newsletter**

**(Newsletter for DRAFT Recommendations Provided at the Workshop)**





## CONTACT INFORMATION

If you have any further questions please contact Mark Freeman or Nancy Horne as listed below. To learn more about NCDOT Rail Division safety programs visit [www.bytrain.org](http://www.bytrain.org).

**Mark Freeman, PE,**  
**AICP**

**Gibson Engineers, PC**  
PO Box 700 Fuquay-Varina,  
NC, 27526  
Phone: 919-552-2253

**Nancy Horne, PE**  
**Project Engineer**  
**NCDOT Rail Division**  
1556 Mail Service Center  
Raleigh, NC 27699-1556  
Phone: 919-715-3686

## STUDY PHASES

INV

### 1. Preliminary Planning

This phase consists of NCDOT working with the consultant, (in the completion of the evaluation was for the completion of the crossing closure

### 2. Study Phase (continued)

assessing all public study area. The account the presence of both trains and crossing closure

**NEAR-TERM RECOMMENDATIONS**  
of flashing lights and gates or four quadrant concrete or rubber, crossing roadway approach

**MID-TERM RECOMMENDATIONS**  
connector roads, road studies, and crossing

**LONG-TERM RECOMMENDATIONS**  
of grade separation

### 3. Implementation

Study Phase is funding for the agreements with property attainment appropriate office The study team implementing the gathered from the



## PUBLIC SEPARATION STUDY

## PUBLIC OUTREACH

The public outreach programmed is designed to allow for early and open communication with stakeholders, area residents, property owners, and others interested in the TSS. Also local NCDOT officials have been meeting with the corresponding railroads.

Public meetings, similar to the one held on DATE, are part of a public outreach process hosted by the North Carolina Department of Transportation Rail Division along with the City of Henderson to provide information as well as obtain comments on the proposed plans for the city.



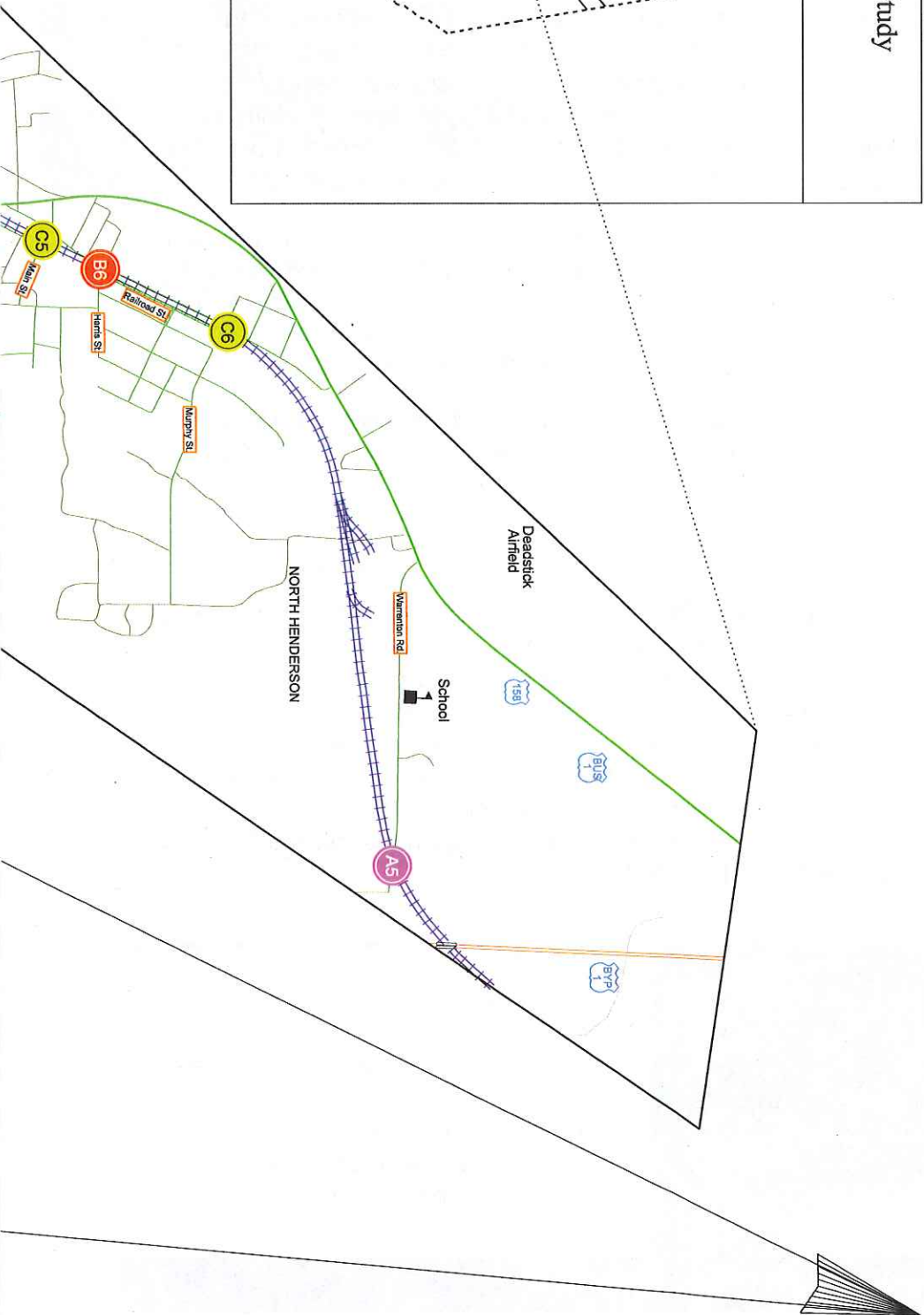
WWW.BYTRAIN





| A : NO ACTION                                                                                                                                                                                                                                                                                                                                                                                  | B : CLOSURE                                                                                                                                                                                                                                     | C : SAFETY IMPROVEMENTS                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1: 630 497F: J.P. Taylor Rd : No Action<br>A2: 630 495S: Welcome Ave : No Action<br>A3: 630 489N: Chavasse Ave : No Action<br>A4: 630 451S: Pedestrian Crossing : No Action<br>A5: 630 424V: Warrenton Rd : No Action<br>A6: 630 423N: Private Rd : No Action<br>A7: 630 421A: Greystone Rd : No Action<br>A8: 630 419Y: Buchan Best Ln : No Action<br>A9: 630 418S: Brookston Rd : No Action | B1: 630 494K : St. Mathews St. : Closure<br>B2: 630 487A : Orange St : Closure<br>B3: 630 486T : Winder St : Closure<br>B4: 630 433U : Rock Spring St : Closure<br>B5: 630 432M : Carolyn Court : Closure<br>B6: 630 428X : Harris St : Closure | C1: 630 498M : Warehouse Rd : Install gates<br>C2: 630 488G : Spring St : Replace ganitilever or closure<br>C3: 630 485L : Montgomery St : Remove parking along street<br>C4: 630 483X : Andrews Ave. : Possible intersecction revisions<br>C5: 630 429E : Main / Craig Ave : Possible realignment of intersection of Main and Old Norlina<br>C6: 630 427R : Railroad St : Install gates or closure |

## Traffic Separation Study Vincity Map





**Appendix C**  
**Public Meeting Sign-In Sheets**





# SIGN IN SHEET

Please sign in so that we may have a record of attendance.

Date: 11-17-09

## Sign In Sheet for: Henderson Traffic Separation Study

Name

### Address

| Name             | Address                                  |
|------------------|------------------------------------------|
| Dave W. Ramsey   | PO Box 307, 704 Mayshy Rd. Henderson, NC |
| Charlotte Brewer | 215 Ridge Circle Rd Henderson NC         |

Sam Brenner 215 Ridge Circle Rd., Henderson, N.C.

Shirley M. Newton 1315 Kight St. Henderson NC

Michael BODDITT DOB 791 HENDERSON NL 27586

DOUGLAS FARM 119 E VALLEY AVE HENDERSON, N.C. 27535

Monte Jernick T-0B 2243 Henderson NC 27531

Brace + Hiram Hupston 1328 Pine St. Henderson 2?537

Hill Marjorie Program 1114 Murphy RD. Henderson N.C. 2753.

Dorothy B Williams 209 HAWKINS RD Henderson NC 27536

Mary Harris 304 Hawkins Ave. Henderson Nc 27536

Patricia Gentry 519 Bill Bagg Ed. Henderson, N.C.  
Chris Lot

Bria Rans 25 Oak Forest Dr. Henderson

THORACE L. BULLOCK 129 So. Bullock St. Henderson, NC 27536

John H Falkner 215 Crestwood Road Henderson 27536

WES. TERRY 414 PATTAN RD. HENDERON, NJ 07036

Mark Hellman NCDOT-Div. 5

ERRIS J DUNSTON ~~KIC 201~~-DIV. 134 ROSE AVE HENDERSON, NC 27534

ED BRINKLEY 1220 FILMORE ST. RAL. N.C. 27605

15m M<sub>1</sub> 156 Church ST 003 Henderson, NC 27536

Craig Bailey 205 Bellwood Dr Henderson, NC 27536

Bernice Yancey 623 Rowland St. Henderson, NC 27536



# SIGN IN SHEET

Please sign in so that we may have a record of attendance.

Date: 11-17-09

Sign In Sheet for: Henderson Traffic Separation Study

| Name                  | Address                               |
|-----------------------|---------------------------------------|
| Jetsie Solomon        | 815 Hawkins Dr Henderson NC 27536     |
| Calvin Pagan          | 1110 Murphy Rd Henderson N.C. 27536   |
| Johnny Oakes          | 1050 Tower Rd Henderson, NC 27537     |
| Stephen Winstead      | 321 Lillburg Rd Henderson NC 27537    |
| Jeffrey Franklin Gast | Dispatch newspaper Henderson          |
| Kirby Aiken           | 1050 Tower Rd Henderson               |
| Rachel Daye           | 919 N. Pinkston St.                   |
| ET, SSA Yount         | 216 Chavasse Ave                      |
| AIA NGill             | P.O. Box 1556 Henderson, NC           |
| Jason Stewardson      | 128 S Chestnut St Henderson NC 27536  |
| Iris Dethmers         | 224 W. Belle St. Henderson, NC 27536  |
| Rick Brand            | 1849 Parker Lane, Henderson, NC 27536 |
| Mike Moe              | 1220 Walters St Henderson NC 27536    |
| Lara Coffey           | 339 W Young Ave Henderson NC 27536    |
| George HARVIN         | 231 S Garritt Henderson               |
| Helen Pagan           | 1110 Murphy Rd Henderson NC 27536     |
| Cathy Thoms-Rudoy     | 216 W. Belle St. Henderson NC 27536   |
| Curtis White          | P.O. Box 1528 Henderson NC 27536      |

# SIGN IN SHEET

Please sign in so that we may have a record of attendance.

Date: 11-17-09

Sign In Sheet for: Henderson Traffic Separation Study

Name

Address

|               |                                  |
|---------------|----------------------------------|
| Leo Kelly     | 1214 Alpha St Henderson NC 27536 |
| Elmora Harris | 950 Patton Cui                   |
| Carol Kasper  |                                  |
| Lora Duke     | P.O. 1085 Henderson NC 27536     |







## **Appendix D**

### **GradeDec**







### DEVICES – BASE CASE

| No. | Crossing ID | Milepost | Description             | Base Case Device |
|-----|-------------|----------|-------------------------|------------------|
| 1   | 630418S     | 108.64   | CSX - BROOKSTON RD      | Gates            |
| 2   | 630419Y     | 108.89   | CSX - Buchan Best Ln    | Passive          |
| 3   | 630421A     | 110.09   | CSX - GREYSTONE RD      | Gates            |
| 4   | 630424V     | 111.08   | CSX - WARRENTON RD      | Gates            |
| 5   | 630427R     | 112.45   | CSX - RAILROAD ST       | Passive          |
| 6   | 630428X     | 112.78   | CSX - HARRIS STREET     | Gates            |
| 7   | 630429E     | 112.94   | CSX - MAIN STREET       | Gates            |
| 8   | 630432M     | 113.16   | CSX - Carter's Crossing | Lights           |
| 9   | 630433U     | 113.4    | CSX - ROCK SPRING ST    | Gates            |
| 10  | 630483X     | 113.58   | CSX - ANDREWS AVENUE    | Gates            |
| 11  | 630485L     | 113.84   | CSX - MONTGOMERY STREET | Gates            |
| 12  | 630486T     | 113.98   | CSX - WINDER STREET     | Gates            |
| 13  | 630487A     | 114.05   | CSX - ORANGE ST         | Gates            |
| 14  | 630488G     | 114.17   | CSX - SPRING ST.        | Gates            |
| 15  | 630489N     | 114.42   | CSX - CHAVASSE AVE      | Gates            |
| 16  | 630494K     | 115.26   | CSX - ST. MATTHEWS ST   | Gates            |
| 17  | 630495S     | 115.78   | CSX - WELCOME AVE       | Gates            |
| 18  | 630497F     | 116.13   | CSX - J P TAYLOR RD     | Gates            |
| 19  | 630498M     | 116.18   | CSX - WAREHOUSE RD      | Passive          |





### DEVICES – PHASE I

| No. | Crossing ID | Milepost | Description             | Phase I Device |
|-----|-------------|----------|-------------------------|----------------|
| 1   | 630418S     | 108.64   | CSX - BROOKSTON RD      | Gates          |
| 2   | 630419Y     | 108.89   | CSX - Buchan Best Ln    | Passive        |
| 3   | 630421A     | 110.09   | CSX - GREYSTONE RD      | Gates          |
| 4   | 630424V     | 111.08   | CSX - WARRENTON RD      | Gates          |
| 5   | 630427R     | 112.45   | CSX - RAILROAD ST       | Passive        |
| 6   | 630428X     | 112.78   | CSX - HARRIS STREET     | Gates          |
| 7   | 630429E     | 112.94   | CSX - MAIN STREET       | Gates          |
| 8   | 630432M     | 113.16   | CSX - Carter's Crossing | Closure        |
| 9   | 630433U     | 113.4    | CSX - ROCK SPRING ST    | Gates          |
| 10  | 630483X     | 113.58   | CSX - ANDREWS AVENUE    | Gates          |
| 11  | 630485L     | 113.84   | CSX - MONTGOMERY STREET | Gates          |
| 12  | 630486T     | 113.98   | CSX - WINDER STREET     | Closure        |
| 13  | 630487A     | 114.05   | CSX - ORANGE ST         | Gates          |
| 14  | 630488G     | 114.17   | CSX - SPRING ST.        | Closure        |
| 15  | 630489N     | 114.42   | CSX - CHAVASSE AVE      | Gates          |
| 16  | 630494K     | 115.26   | CSX - ST. MATTHEWS ST   | Gates          |
| 17  | 630495S     | 115.78   | CSX - WELCOME AVE       | Gates          |
| 18  | 630497F     | 116.13   | CSX - J P TAYLOR RD     | Gates          |
| 19  | 630498M     | 116.18   | CSX - WAREHOUSE RD      | Gates          |

### DEVICES – PHASE II

| No. | Crossing ID | Milepost | Description             | Phase II Device |
|-----|-------------|----------|-------------------------|-----------------|
| 1   | 630418S     | 108.64   | CSX - BROOKSTON RD      | Gates           |
| 2   | 630419Y     | 108.89   | CSX - Buchan Best Ln    | Passive         |
| 3   | 630421A     | 110.09   | CSX - GREYSTONE RD      | Gates           |
| 4   | 630424V     | 111.08   | CSX - WARRENTON RD      | Gates           |
| 5   | 630427R     | 112.45   | CSX - RAILROAD ST       | Closure         |
| 6   | 630428X     | 112.78   | CSX - HARRIS STREET     | Gates           |
| 7   | 630429E     | 112.94   | CSX - MAIN STREET       | Gates           |
| 8   | 630432M     | 113.16   | CSX - Carter's Crossing | Closure         |
| 9   | 630433U     | 113.4    | CSX - ROCK SPRING ST    | Closure         |
| 10  | 630483X     | 113.58   | CSX - ANDREWS AVENUE    | Gates           |
| 11  | 630485L     | 113.84   | CSX - MONTGOMERY STREET | Gates           |
| 12  | 630486T     | 113.98   | CSX - WINDER STREET     | Closure         |
| 13  | 630487A     | 114.05   | CSX - ORANGE ST         | Closure         |
| 14  | 630488G     | 114.17   | CSX - SPRING ST.        | Closure         |
| 15  | 630489N     | 114.42   | CSX - CHAVASSE AVE      | Gates           |
| 16  | 630494K     | 115.26   | CSX - ST. MATTHEWS ST   | Gates           |
| 17  | 630495S     | 115.78   | CSX - WELCOME AVE       | Gates           |
| 18  | 630497F     | 116.13   | CSX - J P TAYLOR RD     | Gates           |
| 19  | 630498M     | 116.18   | CSX - WAREHOUSE RD      | Gates           |



## BENEFITS AND COSTS

